UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

September 24, 2004

Colonel Jeffrey J. Dorko
Southwestern Division
U.S. Army Corps of Engineers
1100 Commerce Street
Dallas, Texas 75242-0216

Dear Colonel Dorko:

The Quality Management Plan for the Corps of Engineers within U.S. EPA Region 6 has been reviewed and is approved. This plan will expire one year from the date of my signature. Enclosed is a copy of the signed approval page for your records. This plan has been assigned the QTRAK number 04-533 for reference.

Should you have any questions or concerns, please feel free to contact Charles Ritchey at (214) 665-8350 or I can be reached at (214) 665-8343.

Very truly yours,

Donald L. Johnson
Regional Quality Assurance Manager

Enclosure

cc: Frank McStay w/enclosure
Charles Ritchey (6PD)

US Army Corps of Engineers

Quality Management Plan

August 2004

Prepared For:

US Environmental Protection Agency
Region 6

1445 Ross Avenue
Dallas, Texas 75202-2733

Prepared By:

US ARMY CORPS OF ENGINEERS

US Army Corps of Engineers

Quality Management Plan
Approval Sheet

Approved: _____ Date: 9/24/04
Region 6 Quality Assurance Officer

Approved: _____ Date: _____
Region 6 Quality Assurance Staff

Hereby concur that this plan is in compliance with EPA Region 6, Quality System requirements for execution of Environmental Activities conducted by Corps of Engineers.

EPA Region 6 QTRAK Number 04-533

INTRODUCTION

It is a regulatory requirement and a policy of EPA that all environmental programs conducted on behalf of EPA shall establish and implement effective Quality Systems. EPA policy requires that all organizational units document their Quality System in a Quality Management Plan (QMP), formerly called a Quality Assurance Program Plan (QAPgP) and submits it to EPA for approval. Quality Systems encompass the management and technical activities necessary to plan, implement, and assess the effectiveness of quality assurance (QA) and quality control (QC) operations applied to environmental programs. This QMP document is submitted to EPA Region 6, for approval in compliance with above-mentioned requirements. This QMP document provides the general policy and procedures for the execution of environmental programs by the Corps of Engineers within EPA Region 6.

Concurrence:

US Army Corps of Engineers
Southwestern Division
1100 Commerce Street
Dallas, Texas 75242

for _____ Date: 9/6/04
Jeffrey J. Dorko
Colonel, US Army
Commander

_____ Date: 9/2/04
Gary Loew
Director, Programs Directorate

_____ Date: 9-9-04
Ed Watford
Acting Director, Regional Business Directorate

_____ Date: 1 Sept. 04
Manuel Fano
Acting Chief, Business Technical Division

_____ Date: 1 Sep 04
Gerald C. Penland, P.E.
Chief, Military Integration Division

_____ Date: 1 Sep 04
B. Scott Weber, P.E.
Team Leader, Environmental CoP

Prepared by:

_____ Date: 01 Sep 04
Frank McStay, Jr., P.E.
SWD HTRW Quality Assurance Coordinator

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for M. B. Jurkin, COL EN

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Brigadier General, US Army
Division Engineer

Date: 8 Sep 04

Larry E Banks for

Mike Rogers
Programs Director

Date: 9/8/04

for Rayford Williams

Daniel Hitchings
Regional Business Director

Date: 9/8/04

Ken Klaas

Michael P. Fallon, P.E.
Chief, Business Technical Division

Date: 9/8/04

David Vigh
HTRW Quality Assurance Coordinator

Date: 9/7/04

Concurrence (continued):

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South Pacific Division
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San Francisco, CA 94105-2295

For Joseph Schroedel COL, EN — Date: 8 Sep 04
Joseph Schroedel
Brigadier General, U.S. Army
Division Engineer

Judith D. Clarke — Date: 9-7-04
Judith S. Clarke
Acting Director, Regional Business Directorate

for Stephen E. Browning — Date: 9-2-04
Stephen E. Browning, P.E.
Director, Programs Directorate

Stephen P. Miller — Date: 8/27/04
Stephen P. Miller
Acting Chief, Military Integration Division

Vincent Del Greco — Date 8/27/04
Vincent Del Greco
Acting Team Leader, Environmental Programs

Vincent Del Greco — Date: 8/27/04
Vincent Del Greco
HTRW Quality Assurance Coordinator

Concurrence (continued):

US Army Corps of Engineers
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220 NW 8th Ave.
Portland, OR 97209-3589

COLONEL
DEPUTY

for William T. Grisoli
Brigadier General, U.S. Army
Division Engineer

Date: 10 SEP 04

Karen Durham-Aguilera, P.E.
Director, Programs Directorate

Date: 7 Sep 04

Kevin J. Brice, P.E.
Acting Director, Regional Business Directorate

Date: 5 Sep 04

Surya Bhamidipaty, P.E.
Chief, Business Technical Division

Date: 2 Sep 2004

James W. Cumper, P.E.
Quality Assurance Team Leader

Date: 30 Aug 04

Laura Kemp
HTRW Quality Assurance Coordinator

Date: 1 Sep 04

DISTRIBUTION LIST

	Copy Number
EPA Region 6 Quality Assurance Office	1
CEMP-RA HQ USACE (David Koran)	2
CENWO-HX-S USACE HTRW Center of Expertise (Heidi Novotny)	3
CEHNC-OE-CX USACE OE Center of Expertise (John Sikes)	17
CEERD-EP-C Environmental Chemistry Branch (Douglas Taggart)	18
CENWO-PM-H USACE Rapid Response (Mark Herse)	19
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1. Management and Organization

1.1 **Purpose**. This document provides general policy and principles for improving the quality of engineering and construction services and products delivered to EPA Region 6, and/or associated customers and partners.

1.1.1 Applicability. This QMP establishes policy requirements for the conduct of all environmentally related activities performed by or for the US Army Corps of Engineers (USACE) in the execution of work for and within Region 6 of the US Environmental Protection Agency (EPA). Several USACE organizations provide services to EPA Region 6 including Southwestern Division and Districts; Mississippi Valley Division and Districts; South Pacific Division and Districts; Northwestern Division and Districts, USACE Centers of Expertise; USACE laboratories; and USACE field operating activities.

1.1.2 Scope. This plan is an active working document and requires updating on an annual basis (a minimum requirement). Changes in workload, staffing, organization, and administrative guidance are reflected in each annual update. This QMP is distributed to each MSC and District within EPA Region 6 boundaries and other USACE entities performing work within EPA Region 6. A point of contact (POC) for each of these groups is included on the Distribution List on page viii. These POCs maintain their respective location's "official" hard copy version. Additionally, an electronic version is distributed to each location. Southwestern Division coordinates updates and is responsible for distribution of the initial plan and updates to the POCs. The POCs are instructed to distribute the plan widely within their organization and are reminded of their responsibility to do so with each update.

1.1.3 References.

a. DoD "Quality Systems Manual for Environmental Laboratories"
b. EC 15-1-16, Information Resources Management (IRM) Committees.
c. EM 200-1-1, Validation of Analytical Chemistry Laboratories.
d. EM 200-1-2, Technical Project Planning (TPP) Process.
e. EM 200-1-3, Requirements for the Preparation of Sampling and Analysis Plans.
f. EM 200-1-6, Chemical Quality Assurance for HTRW Projects.
g. EM 200-1-7, Performance Evaluation (PE) Program
h. EM 385-1-1, Safety and Health Requirements Manual.
i. EP 415-1-266, Resident Engineers Management Guide (REMG) for Hazardous, Toxic and Radioactive Waste (HTRW) Projects
j. EP 715-1-7, Architect-Engineer Contracting.
k. EPA QA/G4, Guidance for the Data Quality Objectives Process
l. EPA QA/R-2, EPA Requirements for Quality Management Plans.
m. ER 5-1-10, Corps-wide Areas of Work Responsibility.
n. ER 5-1-11, U.S. Army Corps of Engineers Business Process.

o. ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OEW) Activities.
p. ER 1110-1-12, Engineering and Design Quality Management.
q. ER 1110-1-261, Quality Assurance of Laboratory Testing Procedures
r. ER 1110-1-263, Engineering and Design Chemical Data Quality Management for HTRW Remedial Activities.
s. ER 1110-1-8100, Laboratory Investigations and Testing
t. ER 1110-1-8156, Policies, Guidance, and Requirements for Geospatial Data and Systems
u. ER 1110-1-8157, Geotechnical Data Quality Management for Hazardous Waste Remedial Activities
v. ER 1110-1-8159, DRCHECKS
w. ER 1180-1-6, Construction Quality Management.

1.1.4 Policy. The policy of USACE is to deliver an excellent level of quality engineering and construction services and products to customers and partners on schedule and within budget. Excellent level of quality does not imply perfection, but assures no compromise of functional, health or safety requirements, conformance to the customer's requirements (functional, technical, aesthetic, environmental) and expectations, consistent with the appropriate technical criteria. The USACE Program and Project Management Business Process (PMBP) as described in ref. 1.1.3.n., is the process by which all work is accomplished by USACE, without exclusion. This policy is consistent with the Total Army Quality (TAQ) concept and philosophy. Adherence to the following principles will contribute to achieving this policy.

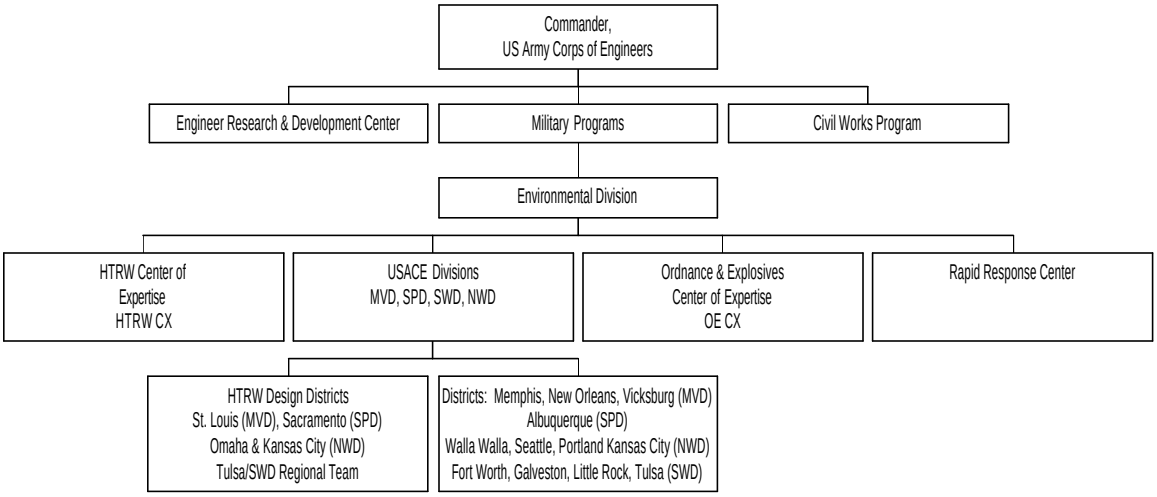
+ Customer Focused Environment . Agreements are developed and documented with customers and project managers on their requirements and expectations. In addition to functional, technical, aesthetic and environmental requirements, these agreements shall reflect schedules and budgets that are reasonable and attainable. These agreements are incorporated in the project management plan (PMP). Cooperation and open communication are established and sustained between customers, and technical management elements.
+ Continuous Process Improvement . An organized, systematic approach is employed to assure continuous process improvement. This approach is employed to the extent that implementation costs are reasonable for the results that are potentially achievable.
+ Empowerment of People . People are provided maximum authority commensurate with their responsibilities and held accountable for results. In addition to technically oriented training, training in teamwork and process improvement concepts is also provided. (As outlined in ref. 1.1.3.p., our USACE document ER 1110-1-12.)

The USACE has reaffirmed its commitment to the environment by formalizing a set of "Environmental Operating Principles" (EOPs) applicable to all its decision-making and

programs. These principles foster unity of purpose on environmental issues, reflect a new tone and direction for dialogue on environmental matters, and ensure that all employees consider conservation, environmental preservation and restoration in all Corps activities. Further information is available at www.usace.army.mil and selecting the Environmental Principles topic.

1.2 **Organization**. The USACE is a major Army command, led by the Chief of Engineers. The Corps has three program directorates, Civil Works, Research, and Military Programs. The USACE Environmental Division within the Military Programs Directorate manages and oversees the Corps' nationwide environmental mission and reports to the Director of Military Programs. The environmental mission within the Corps is executed by the field organization composed of MSCs, Centers, and Districts. The EPA Region 6 boundaries encompass parts of three MSCs, Mississippi Valley Division (MVD), South Pacific Division (SPD), and Southwestern Division (SWD). Other MSCs and their Districts may also perform work within the EPA Region 6 boundaries such as Northwestern Division (NWD) and Omaha District. All of the Corps' MSCs receive guidance and policy from the Chief of Engineers and ensure their Districts implement and follow the guidance. Each MSC commands four or more Districts. At least one District within each MSC has been designated as a Hazardous, Toxic, and Radioactive Waste (HTRW) Design District. SWD has also established a regional team incorporating all available SWD and SWD District resources in order to conduct environmentally related business on a regional basis.

USACE Environmental Command Structure
(currently being modified as a result of USACE 2012)



In October 2003, USACE approved a plan for reinventing the organization. The plan is called USACE 2012. The plan will result in a new environmental command structure with an emphasis on Environmental Communities of Practice (ECoPs) and Learning Organizations. Future editions of this Management Plan will incorporate these changes.

The HTRW Design Districts and the SWD Regional Team have developed robust technical environmental cleanup and protection expertise and maintain the highest technical standards. Workload is distributed throughout the Corps to execute environmental restoration studies and design. All Corps Districts maintain environmental capabilities and perform simple, straightforward, low cost, routine environmental projects within their District boundaries, as well as management of remedial actions. Routine work includes building demolition/debris removal (BD/DR), containerized HTRW projects, transformer and hydraulic system removals, and underground storage tank removals. In addition, the USACE Rapid Response (RR) program at Omaha District performs time critical removal actions through their rapid response contracts nationwide and internationally.

As a result of USACE 2012, the MSCs are divided into two Directorates, Programs and Regional Business Centers. The Directorate of Regional Business (DRB) will be responsible for driving and leading the Regional Business Center planning and operations. The Directorate of Programs (DP) will be responsible for leading regional program and project execution through program integration offices and District Support Teams. Both Directorates will share responsibility for establishing regional functions to accomplish the regional missions.

The Corps environmental activities are also supported by Centers of Expertise that are responsible for technical oversight, and by research and development laboratories. These centers of expertise provide specialized technical capability and a broad range of support to MSCs, districts, and technical centers. The Center of Expertise (CX) for HTRW is located in Omaha, Nebraska. The HTRW-CX plays a major role in quality assurance for environmental projects by reviewing District products and providing technical assistance/expertise to HQUSACE, MSCs, and Districts, as requested. The Ordnance and Explosive (OE) Center of Expertise is located in Huntsville, Alabama. The OE-CX was established to assist HQUSACE, USACE commands, and laboratories in performing their ordnance and explosives related activities and to maintain state-of-the-art technical expertise for all aspects of ordnance and explosives response activities.

The Engineer Research and Development Center (ERDC) is the US Army Corps of Engineers' distributed research and development command. ERDC consists of seven (7) unique laboratories: four in Vicksburg, Mississippi, and one each in Hanover, New Hampshire, Champaign, Illinois, and Alexandria, Virginia. ERDC headquarters is located in Vicksburg, Mississippi. The ERDC ECB laboratory (ECB) within the Environmental Laboratory provides chemical data quality assurance support to the USACE.

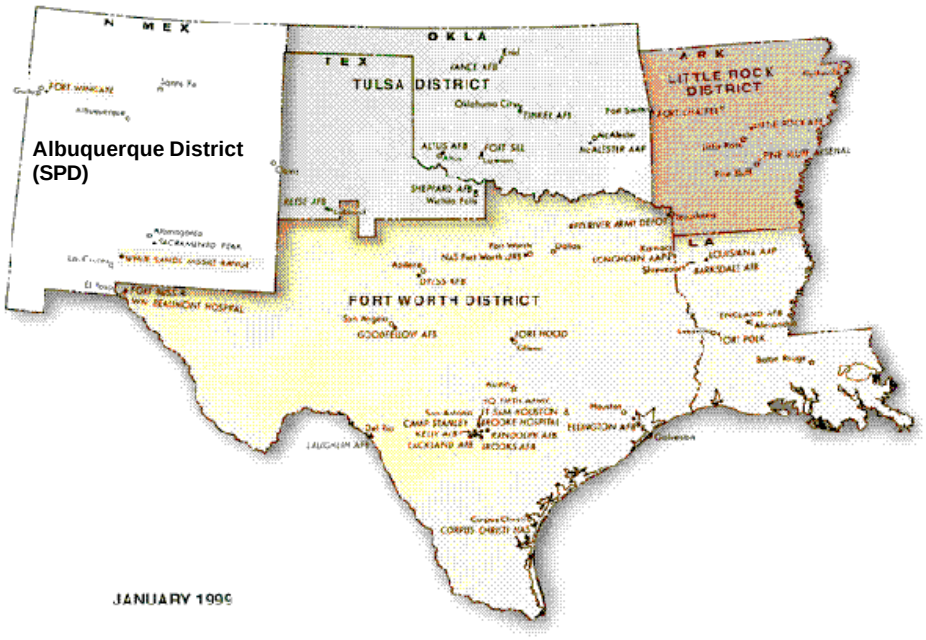
The MSC and District boundaries vary depending upon the type of work performed (Civil Works or Military). Maps showing the Civil Works and Military Programs boundaries within EPA Region 6 are on page 5. The MSCs' organizational charts are on pages 6 – 9. USACE MSC outreach coordinators for EPA Region 6 are listed below.

+ Tom Hudspeth, Southwestern Division, (214) 767-2177

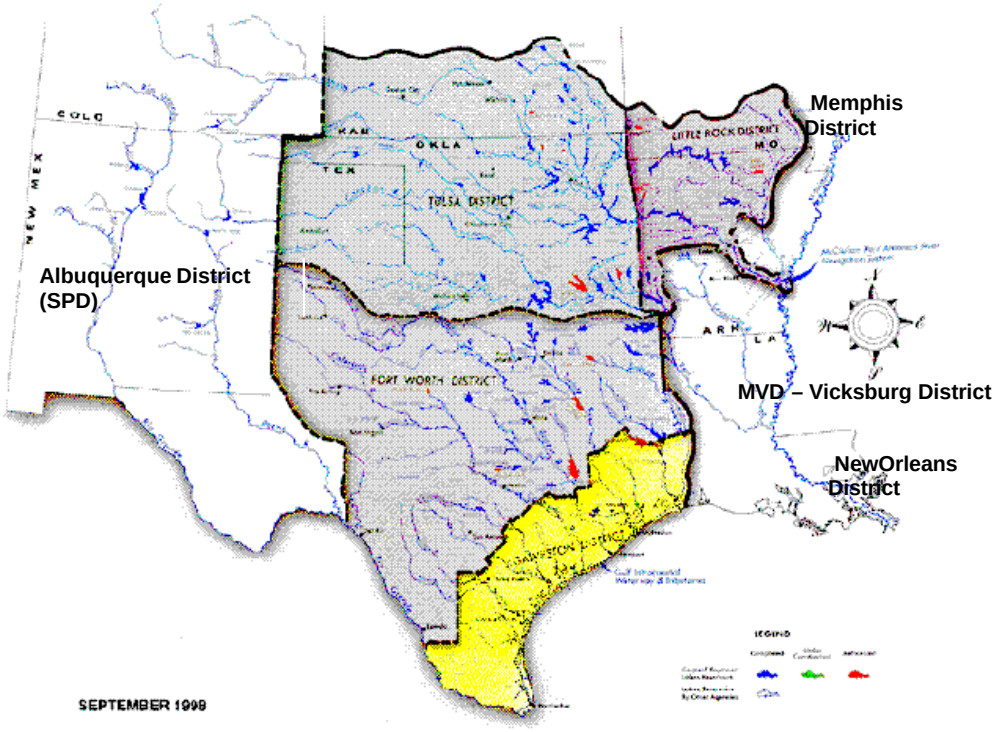
+ Leslie S. Waguespack, Mississippi Valley Division, (601) 634-5829
+ Dan McMindes, South Pacific Division, (916) 557-7399
+ Deb Kobler, Northwestern Division, (402) 697-2403

USACE geographic District project managers serve as the primary POC between all Customers and USACE. Any questions regarding work areas or assigned work should be directed to the MSC outreach coordinators listed above.

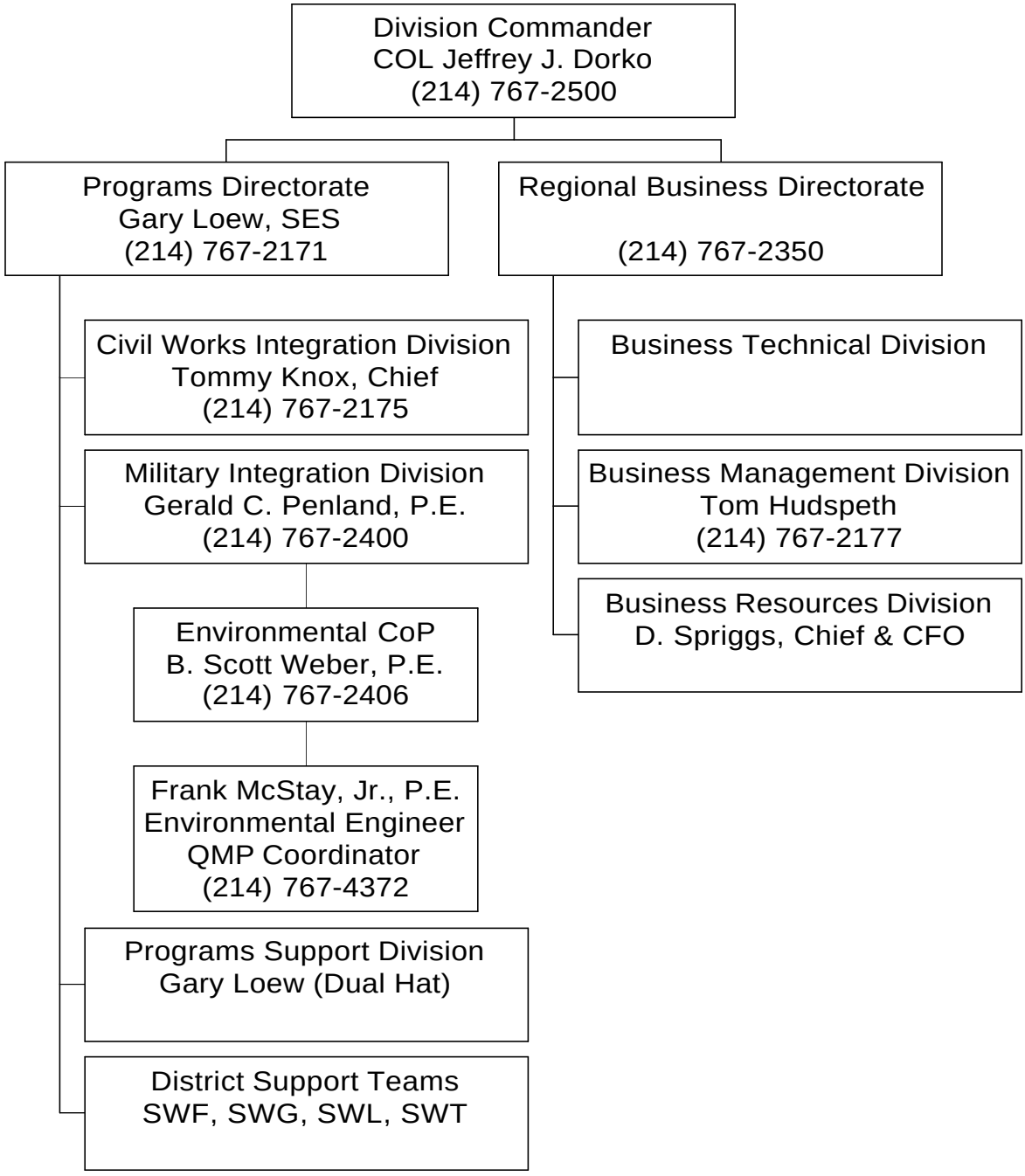
Military Programs Boundaries



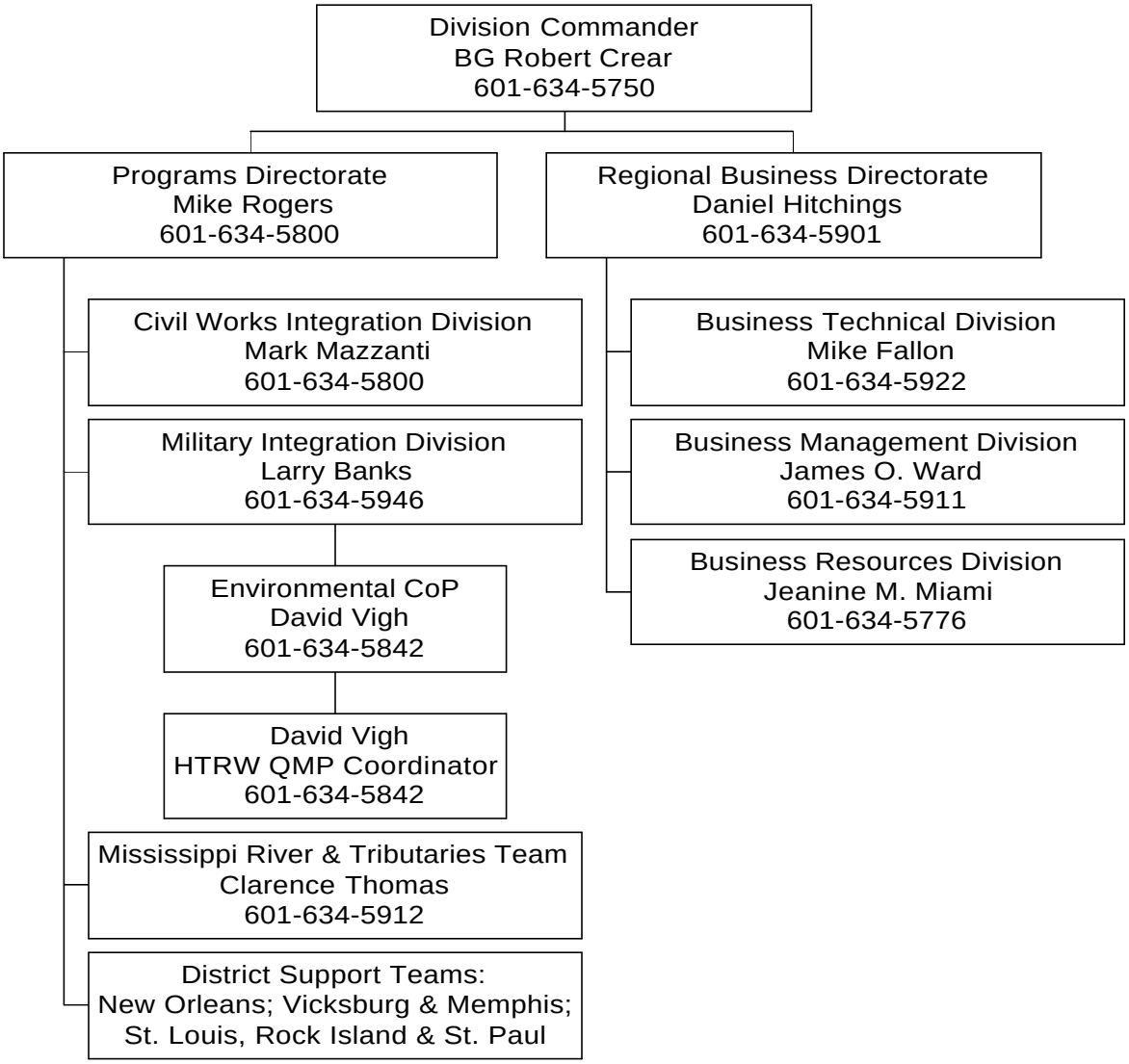
Civil Works Boundaries



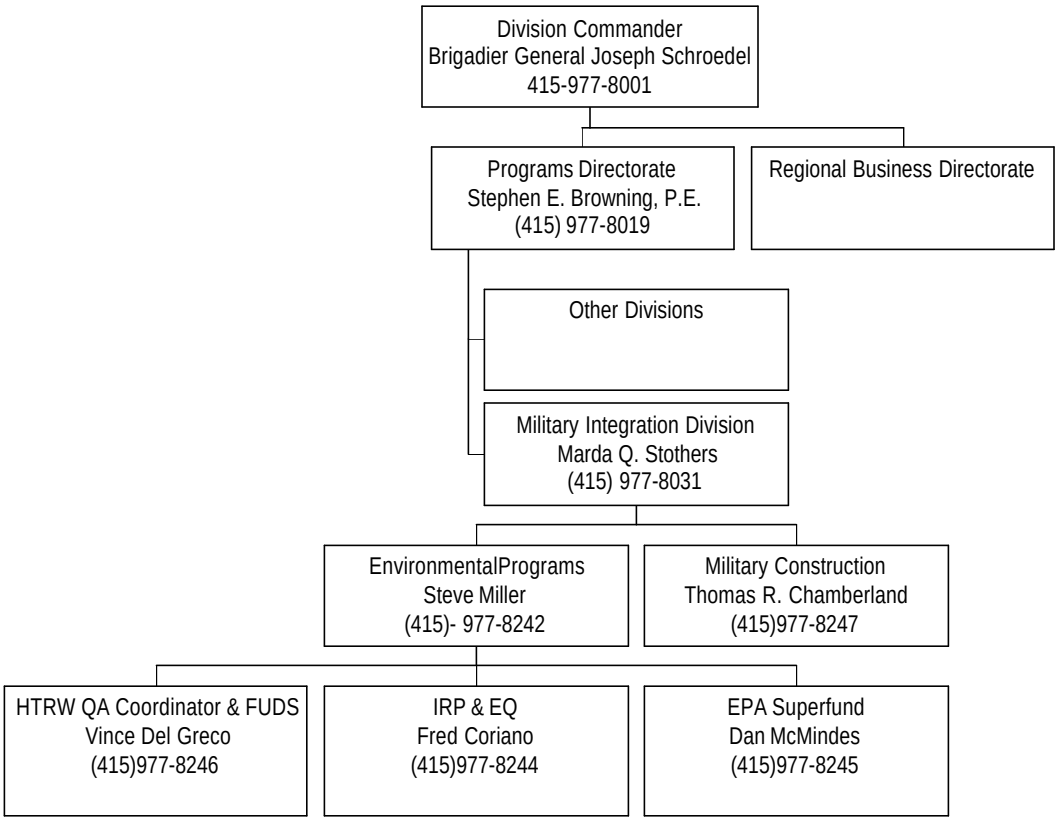
US Army Corps of Engineers Southwestern Division
1100 Commerce Street
Dallas, Texas 75242-0216



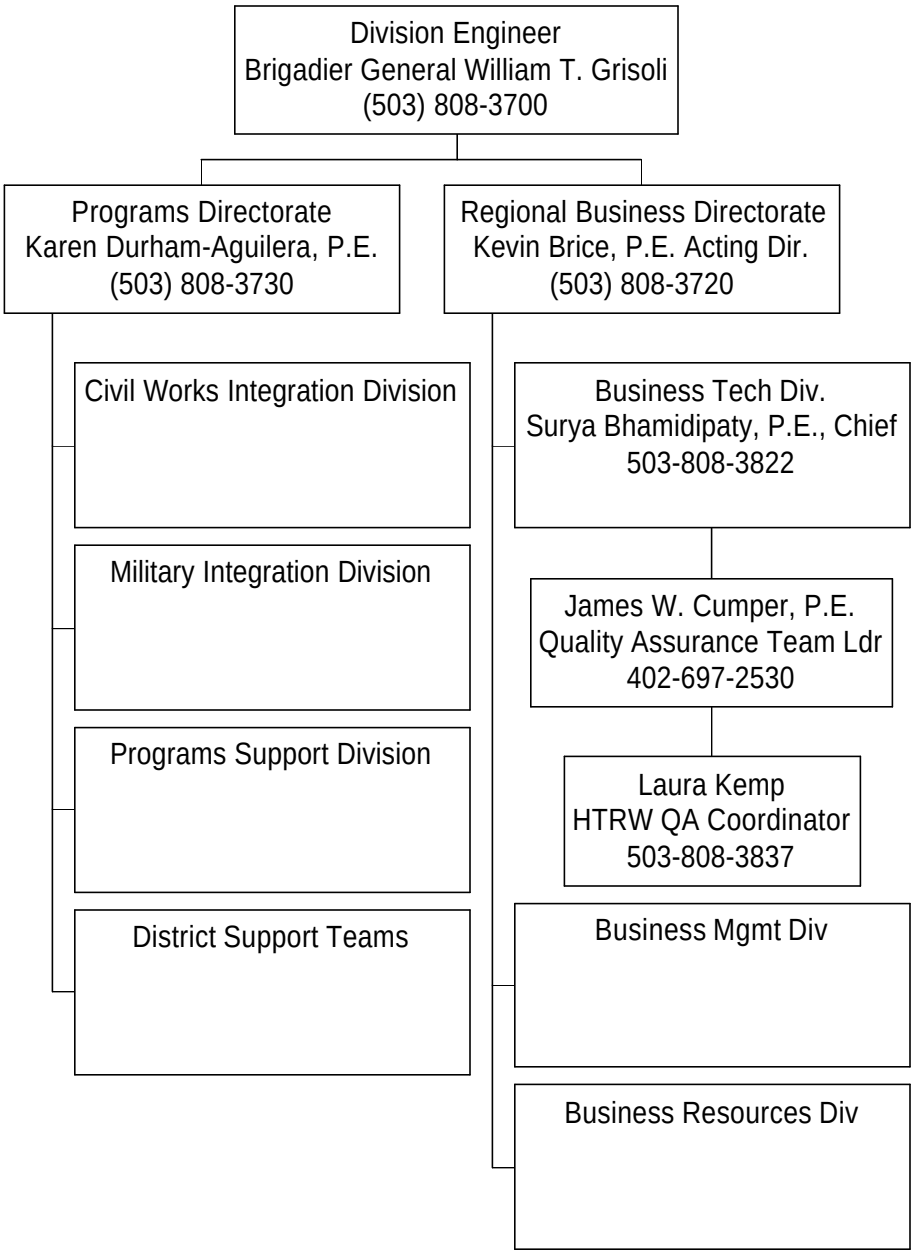
US Army Corps of Engineers Mississippi Valley Division
1400 Walnut Street
P.O. Box 80
Vicksburg, Mississippi 39181-0080



US Army Corps of Engineers South Pacific Division
333 Market Street
San Francisco, California 94105-2295



US Army Corps of Engineers Northwestern Division
220 NW 8th Ave
Portland, Oregon 97209-3589



1.3. **Roles and Responsibilities**. The following paragraphs set forth the roles and responsibilities of the Corps MSCs, the Centers of Expertise (CX), and of the Corps Districts in producing and assuring quality products and services are provided to EPA Region 6, and /or associated customers and partners. In general, Districts are in an execution role and the MSCs provide quality assurance oversight and technical assistance. The Centers of Expertise provide technical review, oversight, and technical assistance as requested. The Corps practices Total Army Quality (TAQ) at all levels in all organizations. TAQ is a leadership philosophy that empowers all individuals to build on the aggregate capabilities of our organization and focuses on continuous process improvement to meet or exceed expectations of our customers. In this regard, TAQ embodies the fundamental aspects of the Total Quality Management (TQM) approach that is responsible for the process' quality.

1.3.1. MSCs. The MSC's role is to enhance the District's mission execution by using TAQ partnering concepts to promote excellence and professionalism, maintain and develop uniform technical criteria, assist Districts in resolution of technical issues and conflicts, assist Districts in enhancing the quality, cost effectiveness, and delivery time of engineering products and services. MSCs provide technical resources and recommendations for process improvements; promote retention/development of technical expertise of District engineering staffs by participation in technical societies, and presentation of technical papers; and promote use of new technology. MSC personnel implement methods to define and promote continuous process improvement in the level of quality for engineering products and services provided by the Districts to assure the safety and operational capability of products and facilities, and to conserve and protect our natural resources and environment. MSC responsibilities include review and approval of District Quality Management Plans (QMPs) and Quality Control Plans (QCPs), regional interface, command and control, and program management of engineering programs as provided in the respective MSC Mission and Function Statements. MSCs may recommend changes in the Districts' quality management and quality control processes, as needed, to assure that (1) Mechanisms and procedures are in-place to enable the Districts and their contractors to produce quality products that comply with established criteria, methods and procedures, and apply competent technical resources to decisions and reviews; (2) Districts and their contractors plan, design and construct safe, functional, cost effective and environmentally sustainable products that accomplish authorized purposes and meet or exceed customer's expectations; (3) The Districts and their contractors develop quality control plans that (a) provide a level of detail appropriate to the type, complexity, and acceptable level of risk of the product; (b) are consistent with guidance provided; and (c) provide for documentation of quality control actions, including reviews, comments, resolution of comments. Quality assurance (QA) responsibilities are executed consistent with the respective MSC functional statements. Functional elements within each MSC have prepared subplans to execute their quality assurance responsibilities based on their functional statements and reflecting products/programs unique to their areas of responsibilities. Senior Managers (-ment) and Quality Assurance Coordinators perform key roles within MSC offices to accomplish and maintain good quality assurance.

1.3.1.1. Quality Assurance Coordinators. Each USACE MSC has a Quality Assurance Coordinator (QAC) to evaluate the quality of environmental products and processes within their MSC. The QACs perform engineering quality assurance evaluations for in-house products and services produced by the Districts and also evaluate the District quality assurance process for A-E products and services. For these evaluations, the QACs are part of an interdisciplinary team consisting of technically qualified individuals from within their MSC, and/or the HTRW-CX, and OE-CX. MSC review of the District's QMP and Quality Control Plans (QCPs) developed for projects are utilized to evaluate the District's quality control process. Also, site visits are conducted and selected products and services are evaluated (technically) as part of the efforts employed to monitor the District's quality process. The QAC reports on quality issues to the Chief of Technical Engineering and Construction Division.

1.3.1.2. Chief, Technical Engineering and Construction Division. The Chief of Technical Engineering and Construction Division provides staff assistance to the MSC Commander and Director, Military and Technical Directorate on all engineering activities of the MSC and their respective Districts. This includes high level design engineering expertise supporting constituent districts for all types of construction including environmental remediation, Civil Works, MILCON, and Support for Others programs. This also includes assisting the respective Districts in assuring quality engineering services and products for our customers in accordance with the Quality Assurance (QA) Plan for their MSC.

1.3.1.3. Directorate of Military and Technical (MT). The Director of MT is the senior technical civilian at the MSC level and reports to the MSC Commander. He or she provides assistance to the MSC Commander and is the key MSC staff member for military program management, real estate, and engineering-construction technical expertise.

1.3.1.4. Directorate of Civil Works and Management (CWM). The Director of Civil Works and Management is the senior management civilian at the MSC level and reports to the MSC Commander. He or she provides assistance to the MSC Commander and is the key MSC staff member for regional program development, justification, defense, and execution oversight.

1.3.1.5. MSC Commander. The MSC Commander has the ultimate responsibility for his or her MSC program as a whole. The Commander is accountable and responsible for ensuring that the actions and products of his or her staff and the Districts produce the desired results.

1.3.2. Centers of Expertise (CX) and QA Support. Centers of Expertise within the USACE provide specialized technical capability and a broad range of support to MSCs, Districts, and Technical Centers. The three environmental program-related expertise centers are the HTRW and Rapid Response (HTRW/RR-CX) in Omaha, Nebraska, and the Ordnance and Explosive Center of Expertise (OE-CX) in Huntsville, Alabama. The HTRW-CX develops technical guidance and standard operating procedures

(SOPs), supports Corps of Engineer's training courses, reviews project documents, and provides specialized technical and legal assistance to the Corps' MSCs and Districts. Each MSC is assigned a technical liaison at the HTRW-CX. This technical liaison advocates MSC and their Districts concerns, serves as the single CX point-of-contact for the MSC/Districts, oversees the CX review of District projects, coordinates and disseminates advice and assistance on HTRW technical policies, coordinates resolution of technical differences of opinion, and supports the use of innovative technologies and research and development programs. The HTRW-CX also supports/participates with MSCs as requested in their quality assurance oversight and audits of HTRW Design District QC processes. Additionally, the HTRW-CX reviews certain key HTRW documents produced by the Districts or by contracts. The OE-CX plans and coordinates OE remediations and safety support, provides quality assurance oversight through all phases of OE support, and reviews the Inventory Project Reports involving OE.

The Rapid Response Center of Expertise (RR-CX) is the central Corps quick response organization and has a broad range of contract and self-performing capabilities for Federal, Mission, and Homeland Defense and Security.

The Engineer Research and Development Center (ERDC) Environmental Laboratory conducts special studies, including research, development, and quality assurance, for environmental analytical chemistry. The laboratory's Environmental Chemistry Branch (ECB, office symbol CEERD-EP-C) located in Omaha, Nebraska, provides quality assurance testing and quality assurance/quality control consultation to Districts, MSCs, and other agencies, as requested. The ECB also supports the HTRW-CX Laboratory Validation program through commercial laboratory inspection. Districts may also obtain quality assurance services through existing commercial contracts.

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1.3.3. Districts. Each District is jointly responsible for all applicable QA/QC activities within their respective District along with the MSC's Quality Assurance Coordinator. Districts are responsible for controlling the quality, cost, and delivery schedule of their engineering products and services by the use of QMPs, Quality Assurance Project Plans (QAPPs), customer requirements, and Quality Control Plans (QCP). The Corps employs a Project Management Business Process (PMBP) to execute projects. This consists of two major components: the management of individual projects, and the oversight of collective projects, activities and services derived from assigned missions. Providing quality products is essential to corporate success and is a shared corporate responsibility. Project managers (PMs) and functional chiefs have a shared responsibility for quality of projects. Successful execution of quality projects requires that all functional elements and disciplines work together. Key roles are outlined below:

1.3.3.1. Project Manager. The individual Project Manager (PM) is assigned by the District Commander or Deputy for Project Management (DPM) and serves as an advisor and consultant to the corporate board and each of its members. Each project will have a single PM regardless of how many USACE organizations are represented on the project delivery team. Generally, this PM will reside at the geographic district. The PM is responsible and accountable for successful completion and delivery of assigned projects within established costs, schedules, and quality parameters. The PM is considered an extension of the Commander, responsible for keeping him or her, and the DPM, informed

and for integrating the individual efforts that make a project successful. The PM provides leadership to a multi-disciplined project delivery team with responsibility for assuring that the project stays focused on the customer's needs and expectations and that all work is integrated and done in accordance with a management plan and approved business processes. The PM assures that the customer's interests are properly represented within USACE and serves as the primary point of contact between the customer and the Corps. The PM keeps the functional chiefs apprised of the customer's expectations and the status of the project's progress, assists in early identification and resolution of problems, and identifies where additional talent and effort are required to meet the District's commitments established in the project management plan. The PM can make District commitments within preassigned constraints as defined in the project management plan in coordination with the functional elements.

1.3.3.2. Project Delivery Team. The project delivery team is a group of technical specialists (e.g. geologist, chemist, risk assessor, regulatory specialist, etc.) needed to achieve the customer's goals for a project. The project delivery team may be contract, in-house, or a combination. This team is responsible for producing quality products.

1.3.3.3. QA/QC Officer. All work performed by contract will have a QA/QC Officer within the contractor organization. For work performed in-house, this role is the responsibility of the District functional chiefs. The Quality Assurance (QA)/Quality Control (QC) Officer or representative is a project specific position. The QA/QC officer is independent of the project delivery team generating the product or service and is a part of the technical organization. The QA/QC officer is responsible for monitoring and verifying that the product or service activity is performed in accordance with the Project Quality Control Plan (QCP), Quality Assurance Project Plan (QAPP), Work Plan, Standard Operating Procedures (SOPs), and other applicable procedures. The QA/QC officer is also responsible for assessing the effectiveness of the QA program and recommending modifications to the program where applicable. The QA/QC officer is responsible for assuring that assigned personnel are appropriately trained relative to the requirements of the QA program, for reviewing and verifying the disposition of nonconformance and corrective action reports, and also for conducting periodic project specific quality assurance audits.

1.3.3.4. QA Representatives. A QA representative is a role typically held by a Corps employee overseeing contract efforts. The QA/QC officer or the PM appoints the QA representative to review, monitor, and report on the conformance to QA program requirements for specific product or service activities or tasks. A QA representative may perform audits and report to the QA/QC officer. The QA representative will maintain records of quality monitoring activities and will inform the QA/QC officer of the progress of these monitoring activities. The QA Coordinator is also a part of the technical organization.

1.3.3.5. Functional Chiefs. The chiefs of technical functions are responsible for developing and maintaining a professional, technically competent workforce; establishing and maintaining the necessary systems, technical processes, and environment to produce

quality products; providing the technical oversight to assure production of quality products; and serving as principal members of the District corporate board. The functional chiefs are also responsible and accountable for the quality of the organization's technical products, assigning qualified members to the project delivery teams, keeping commitments made in various project related plans, and for ensuring that their technical processes produce the desired results.

1.3.3.6. Deputy for Programs and Project Management (DPM). The (DPM) is the District Commander's civilian deputy. The DPM is responsible to the Commander for effective program and project management in the district, and oversees the PMBP. This deputy is responsible for the vertical and horizontal integration to produce the projects and manage the program for the district. The DPM is the senior civilian on the district staff who provides leadership to a corporate board composed of senior staff. The DPM provides continuity of corporate leadership in developing and assessing mission and work requirements and in developing corporate programs, plans, goals, and objectives. All work in the District program is assembled under the DPM's oversight so that priority decisions can be made corporately. To assist in reinforcing integrated teamwork, the DPM will provide input to the Commander concerning the performance of the functional chiefs and their contributions to project delivery.

1.3.3.7. District Commander. The District Commander has the ultimate responsibility for each project and his or her District program as a whole. The commander is accountable and responsible for ensuring the actions and products of his or her staff produce the desired results.

1.3.4. Teamwork. USACE acts in unison across District and MSC boundaries to draw on its strengths regardless of geographical location. Project delivery and program execution will appear seamless to the customer. Each USACE level commits itself to support project priorities and provide the necessary resources to meet commitments made to customers. The (District) DPM and his or her supporting staff foster the teamwork approach to establish universal linkages to facilitate seamless customer service.

1.3.4.1. Project delivery teams work in concert to deliver projects that are consistent with customer expectations and corporate needs. The PM ensures that the direction and efforts of the project delivery team are unified, focused, and coordinated.

1.3.4.2. Each member of the project delivery team keeps his or her respective organizational element/ functional chief informed at all times, especially of high priority or sensitive project issues.

2. Quality System and Description

The MSCs and their respective districts develop and implement quality management practices, including quality assurance (QA) for related programs and quality control (QC) for various projects, that ensure that technical products meet the agreed upon requirements of the customer and the appropriate laws, policies, and technical criteria, on schedule and within budget. QA involves those planned and systematic actions necessary to provide adequate confidence that product or service activities are performed satisfactorily and safely. Quality Control (QC) is an integral part of the overall QA functions and is comprised of those actions necessary to control and verify that activities and resulting products or services meet or exceed established requirements. USACE performs both QC and QA activities in the delivery of products and services to our customers and partners.

2.1. **Quality Management Plans**. Each MSC and District has established Quality Management Plans prescribing their policy and procedures for the execution of quality management activities. The District QMPs are reviewed and approved by their respective MSC on an annual basis. This QMP is maintained by the SWD QAC. The plan is revised annually and submitted to EPA Region 6 for review and approval.

2.2. **Quality Control Plans**. A quality control plan (QCP) is prepared by the Districts for every product or service and by the A-E contract forces for contracted work. These plans are updated as warranted. Contract forces may include other Corps offices, other government agencies, and private industry sources. The QCP includes, at a minimum,

(i) a statement of the plan objective,

(ii) a statement of the guidelines that are followed for the technical review,

(iii) a roster of the proposed project study team, or in the case of a generic plan, a list from which the roster would be selected,

(iv) a milestone list and schedule for review activities which integrate the mandated division milestones,

(v) a roster of the proposed technical review team with the number of years and bullet description of relevant experience for each member,

(vi) a list of documents to be reviewed by the technical review team,

(vii) a discussion of proposed deviations from the approved quality management plan,

(viii) the cost estimate for conducting the independent technical review is included either in the quality control plan (or as a separate line item in the project management plan), and

(ix) a description of the resources required to accomplish the activities outlined in the QCP.

Routine or minor products may utilize generic QCPs consistent with overall QA/QC roles. Programmatic QCPs are developed and utilized for routine, major programs. Generic and programmatic QCPs include the minimum items listed above. The chief of the functional

elements having overall responsibility for a product or service is responsible for development of the QCP with input from other functional elements involved in development of the product or service. QCPs for decision and implementation documents are submitted to the MSC for review and approval. Exceptions to minimum requirements for QCPs are also submitted to the MSC for approval.

2.3. **Quality Assurance Plans**. In accordance with the terms of all Interagency Agreements with EPA Region 6, a separate (government) Quality Assurance Plan is developed for contracts administered by the Corps of Engineers, to assure that the contractor's quality control system is functioning as stated in the plan. The Quality Assurance Plan includes a Surveillance Plan and outlines testing frequencies for engineering, construction, and analytical products and services.

2.4 **Independent Technical Review**. Key to the successful execution of the quality control process for the products and services is the independent technical review or assessment of a product. This review is accomplished by an independent technical review team (ITRT) composed of individuals having expertise in disciplines involved in the type of product being developed and reviewed, who have a minimum of five years experience in the discipline and who were not involved in product or supervision thereof. Typically, ITRT members are identified in the QCP. Five review options are available to Districts for conducting independent technical reviews. The reviews are conducted (i) within the District, (ii) by another District, (iii) in Centers of Expertise (CX), (iv) by teams or individuals throughout USACE, or (v) by a contract team or consultant. For complex projects, technical experts or consultant review is sometimes needed in addition to normal review. Independent technical review does not replace the need for and conduct of design checks or supervisory review of products. Sufficient time and resources are allocated to this process commensurate with the risk and complexity of the technical product. Review comments are constructive in nature, relevant to the product and contain the following elements: (1) A clear statement of the concern; (2) The basis of the concern; (3) The significance of the concern; and (4) The specific actions needed to resolve the concern. The ITRT leader shall review the products and ITRT comments and product development team responses to identify any outstanding disagreements between members of the product development team and the ITRT. Disagreements are brought to the attention of the appropriate functional chief to facilitate resolution. If the interaction does not resolve the issue, the functional chief makes the final decision. Issues resulting from independent technical reviews are resolved at the District level, with assistance of the MSCs, HTRW-CX, OE-CX, and HQUSACE as needed. As policy issues develop, if it is necessary to seek guidance from HQUSACE it is obtained through the functional program manager's coordination. The District is responsible for the technical and policy content of all documents produced within the District. The technical review team documents technical issues, concerns raised during the technical review process, and their resolution.

2.5 **Project Management Plan (PMP)**. Each project is managed in accordance with a project management plan. This project management plan is developed by the PM with the

customer and the other project delivery team members. The PMP is developed and maintained at a level of detail commensurate with the size and complexity of the project. It is a living, working level document that records the history, documents commitments by the MSCs, and the customer, and depicts the future direction of the project. The PMP is a binding agreement among all elements supporting the project that detail how the work is executed and how resources are expended. It defines the quality requirements, baseline scope, schedule, and resources, including contingencies, for the project. The schedule and funding levels are realistic and reflect overall program and budget constraints and realities. It considers all project requirements including real estate, planning, design, engineering, construction, environmental, operations, and other types of work whether performed by the MSCs, customer, or by contract(or). EPA Region 6, or associated customer and the Project Review Board (PRB) approve the plan and all subsequent changes beyond the PM's delegated authority.

2.5.1. The controls and quality requirements placed on the management of each project are consistent with the risks (sensitivity, complexity, uncertainty, etc.) associated with that project and tailored to meet customer requirements consistent with national priorities and policies. This graded approach ensures efficient use of program resources.

2.5.2. All projects are periodically evaluated by the project delivery team against the baseline requirements (quality, scope, schedule and cost) established in the project management plan. The PM has the responsibility to challenge work in progress, identify variances and evaluate alternatives. The project delivery team's focus for meeting project execution goals is to maintain the baseline requirements in the project management plan. Controls are in place to facilitate timely corrective actions to ensure that changes do not exceed performance thresholds or limitations established by laws, policy or regulations. All changes within project resource requirements defined in the management plan are approved by the PM. The PM has the primary responsibility for fiscal integrity and authority to control project funds to ensure they are used appropriately and in accordance with the project management plan. The PM, in coordination with appropriate functional elements, is also responsible for taking prompt action to correct problems identified from internal and external evaluations.

2.6. **Review and Assessment**. The MSCs review and approve each of their respective Districts' QMP and generic QCP at least annually for compliance with MSC (USACE) standards and continuous improvement updates. The HTRW-CX, when requested, provides technical assistance for issues relating to the Districts' QCPs for products and services. Quality management (assurance) reviews for selected District products and services are conducted annually by multi-disciplined MSC Teams.

Project/Program Review Board (PRB) meetings are held periodically at the MSCs (quarterly) and Districts (monthly) to keep senior management informed of progress, resolve issues, and assess performance. PRBs are comprised of the Commander and his or her designated senior staff members. Customers participate in PRB meetings as appropriate. Evaluating project performance produces opportunities to further improve Corps business processes, in terms of execution, productivity, cost effectiveness, streamlined processes, timeliness, quality standards, and customer service. Project

experiences, including success stories, are documented by the PM and the project delivery team to share lessons learned throughout the Corps. Program Management at HQUSACE embodies USACE program and project management business process leadership, resourcing, execution oversight, development of training strategy and programs, equipping and empowering, and evaluations of trends and performance.

Headquarters of US Army Corps of Engineers (HQUSACE) continually assesses policies and guidance and periodically reviews the MSCs' implementation of the USACE Program and Project Management Business Process (PMBP) to evaluate effectiveness. To assure that the quality requirements are met, HQUSACE, in coordination and cooperation with the MSCs will conduct quality management reviews. These reviews are made to assess the effectiveness and implementation of individual USACE command's quality management plans. The reviews are accomplished in a stand-alone mode or in conjunction with other command inspections/reviews (e.g., command inspections, Engineer Inspector General inspections, etc.). Regardless of how conducted, higher authority review of quality management plans at all operating USACE commands are accomplished on a three-year frequency, as a minimum. The MSCs will periodically review their own as well as their executing organizations' implementation of the USACE PMBP to evaluate the effectiveness of their quality assurance, efficiency, and execution. Executing organizations (i.e., districts, field operating activities (FOAs), laboratories, etc.) shall periodically assess their project and program management processes and practices to ensure effective implementation of the plan requirements.

3. Personnel Qualifications and Training

3.1. **Personnel Staffing Requirements**. The prerequisite for the production of a quality product or service is to ensure personnel working on the project have adequate technical skills to do the work. All personnel selected to work on environmental specific programs are qualified to perform assigned tasks in accordance to requirements. It is imperative District staffing levels include sufficient senior professionals to perform current work and provide appropriate on-the-job training of junior staff members. An adequate staff of junior members is to ensure continuation of the District's institutional and technical knowledge. The staffing in HTRW Design Districts (i.e., Tulsa, St. Louis, Kansas City, Omaha, and Sacramento) are compared to staffing models developed by the HQUSACE to insure robust investigation and design capability. If inadequate work exists in the HTRW Design Districts to maintain technical capabilities, workload may be shifted from another District or even MSC. Each HTRW Design District should complete a minimum of 10% of the environmental restoration design workload (including some remedial design activities) using in-house resources with a goal of 10 - 20 % in-house. Another management goal in HTRW Design Districts is that no more than 80% of the pre-RA work is performed by contract. A number of performance measures are used to monitor the goals. Drill and survey crews are also a desirable part of the HTRW Design District. Omaha, Kansas City, and Tulsa Districts have in-house drilling and sampling capability that may be used on environmental projects. The crews all have 40-hour OSHA-approved health and safety training and maintain certification via annual 8-hour refresher courses.

3.2. **Short Term Training**. It is the policy of the Corps of Engineers to provide appropriate training and development opportunities to assure maximum efficiency of civilian members in the performance of their official duties. Training needs are reviewed, and effective training practices and techniques applied in efforts to raise individual performance and to meet present and anticipated needs for individual knowledge, skills and abilities. The Corps has developed a wide array of HTRW courses and workshops tailored to the environmental mission needs. These courses range from the administration of environmental contract delivery orders, risk assessment and management, environmental sampling, safety and health at hazardous waste sites, and environmental regulations, to technological aspects of environmental restoration such as soil vapor extraction and bioventing. In addition, the Corps takes advantage of courses, seminars, and workshops sponsored by other agencies and the private sector.

3.3. **Long Term Training**. To keep the Corps abreast of managerial, technical, and scientific advancements, some members may need training opportunities beyond the customary short-term programs. DOD, HQDA, HQUSACE and local activities provide a variety of long-term training opportunities. These opportunities allow employees to obtain formal, continuous, detailed technical knowledge at major universities. Every Corps member who meets the established criteria and standards are given an equal opportunity to be considered for long-term training and education. Directions from HQUSACE also prescribe minimum expertise requirements for specific specialty areas in various disciplines for the HTRW Design Districts.

3.4. **Resource Sharing**. The development of new technologies, criteria, and methods also requires a minimum level of technical expertise for each discipline, depending on the extent and nature of product, service, or project accomplished by in-house personnel. Utilization of these District specialists MSC-wide or as instructors in Corps sponsored short courses is often employed to improve capabilities within the MSCs. The Military and Technical Directorate at the MSCs identifies HQUSACE mandatory specialist requirements and evaluates them against their respective District staffing; canvasses the respective Districts annually to identify professional experience levels by discipline, specialty area, and technical expertise; and evaluates these experience levels against the quality and review of the products being produced. Any additional training requirements are to be done either by MSC or District personnel, if practical.

3.5. **Individual Development Plans**. It is the objective of the USACE to promote the retention/development of technical expertise of District and MSC engineering staffs by encouraging developmental assignments, quality training, professional registration, participation in technical societies and conferences, etc. Individual Employee Development Plans (IDPs) are prepared and updated on an annual basis. These five-year plans identify developmental objectives (in short and long-term goals), required and recommended training, developmental assignments, and training and self-development already completed. Individual Development Plans (IDPs) are used to encourage continuous employee enrichment and development.

4. Procurement of Items and Services

The policy of the USACE is to deliver excellent engineering and design services and products to customers on schedule and within budget. Federal Acquisitions Regulations (FAR), Defense Federal Acquisition Regulation Supplement (DFARS), Army Federal Acquisition Regulation Supplement (AFARS), and Engineer Federal Acquisition Regulation Supplement (EFARS) govern the procurement process in the Corps. The principles of customer focused environment, continuous process improvement, and empowerment of people and other tools in ER 1110-1-12 (ref. 1.1.3.p.) that are used to improve quality of in-house services also contribute to improving the quality of products and services achieved through contracts. For products developed either wholly or partially by a contractor, development and execution of a QCP for the contractor product is the responsibility of the contractor. The District develops an overall quality assurance plan for overseeing the contractor's quality control activities. The PM discusses with the customer the acquisition process and various options to ensure that customer and project needs are met. The PM uses the project delivery team (see paragraph 1.3.3.2) to develop contractual instruments to acquire engineering, design and construction products and services from A-E firms and/or contractors.

4.1. **A-E Contracts**. Architect–Engineer contracts are used to perform professional engineering, architectural, and surveying services. They are typically used to perform remedial investigation/feasibility study work and remedial designs. Most environmental work is performed as task orders under indefinite delivery/indefinite quantity (ID/IQ) contracts (described in section 4.2.3.).

4.1.1. Procurement Process. The procedures for contracting for architect and engineer services are in accordance with the Brooks Architect Engineer Act. The guidance and purpose are intended to promote fair, efficient and consistent A-E contracting practices throughout USACE. Commanders regularly evaluate the A-E contracting process in their command to ensure compliance with all applicable procurement laws and regulations in the most efficient and effective manner. HQUSACE elements identify and implement regulatory and procedural changes to improve the A-E contracting process throughout USACE and effectively implement new laws and procurement regulations. Periodic Quality Management Reviews, staff assistance visits, automated and special reports, informal coordination, conferences and other appropriate methods are used to monitor the compliance of the USACE commands with the contracting regulations.

Proposed contracts for A-E services are negotiated contracts structured to maximize competition, provide contract opportunities for many firms, and maximize small business and small disadvantaged business participation while satisfying the needs of the Government in the most effective, economical, and timely manner. Public announcements for A-E services reflect the minimum needs of the Government, not arbitrarily restricting eligible firms, and describe the specific work required in sufficient detail to facilitate a meaningful selection of the most highly qualified firm.

4.1.2. Source Selection Board. Evaluation boards are composed of highly qualified professional employees having collective experience in architecture, engineering, construction, and acquisition, as well as the specific type of work being

contracted. All board members comply with the procurement integrity requirements of FAR 3.104. The primary factor in A-E selection is determining the most highly qualified firm based upon specialized experience and technical competence, professional qualifications, and past performance. The primary source of information on past performance is the Architect-Engineer Contract Administration Support System (ACASS) database. (ACASS is an automated database of A-E qualifications, DOD A-E contract awards, and A-E performance evaluations.) Boards only consider the following items: the Standard Form 254 as submitted or from ACASS, the Standard Form 255, with any required supplemental information; documented performance evaluations, such as from ACASS; DOD contract award data, and the results of interviews of the most highly qualified firms.

4.1.3. Negotiations. A-E contract negotiations are conducted in accordance with FAR Subpart 15.8, 36.605 and 36.606, and applicable supplements. An independent government estimate is prepared prior to the negotiations. Negotiations are based on a thorough scope of work that fully conveys the customer's requirements and the pertinent technical criteria. The primary objective in negotiation is to agree on a price which is fair and reasonable to the Government (not necessarily the lowest price) and gives the A-E firm sufficient financial incentive to produce quality services and products on schedule.

4.1.4. Quality. A performance evaluation is prepared for all contracts for A-E services in excess of $25,000 (FAR 36.604). The technical personnel who reviewed and accepted the A-E firm's work prepare this evaluation. The ACASS software is used to facilitate the preparation and routing of the evaluations as well as the transmittal and entry into ACASS.

The quality of an A-E firm's products and services are adequately documented throughout the performance of the contract and the firm kept apprised of the quality of the work. The A-E firm is notified immediately upon recognition of unsatisfactory performance. Interim appraisals are made and areas of poor or excellent performance are documented. The appraisals are retained in the contract files.

The A-E firm is responsible for the quality of its products and services, the Districts are responsible for Quality Assurance of the A-E's products and services, and the MSCs oversee the District's Quality Assurance.

4.2. **Remediation and Construction Contracts**. The very nature of remediation not only creates the need for more innovative methods for cleaning up hazardous sites, but also requires innovative types of contracts to accomplish cleanup missions. This section will summarize the various contracts used by the USACE for remediation services and present an overview of their advantages over traditional contracting methods.

It is the policy of the Corps of Engineers to maximize use of sealed bid procedures for execution of its contracts. The policy is in accordance with 10 U.S.C. 2304 (a) and FAR 36.103. Most construction contracts follow the typical sequence of completion of design before initiation of construction. Most of these same contracts are executed by sealed bid procedures and awarded as a firm-fixed price (FFP) contract.

However, remediation activities typically include many unknowns, and do not always involve construction. Many consist of excavation and treatment or excavation and

disposal. Most criteria are performance based and involve subsurface conditions, quantities, and concentrations that are difficult to define. For this reason, other forms of contracts are commonly used to achieve environmental restoration. Any contract type other than an Invitation for Bid (IFB) is negotiated. Negotiated contracts can be either cost-reimbursable or firm fixed price. It is the responsibility of the Project Manager (PM) and the Project Delivery Team (PDT) to select a contracting mechanism that is appropriate to the project. In order to assure a quality product, the PDT should be involved in each step of the project: from contract acquisition strategy to final project closeout.

In support of the President's Standards for Management and Measures of Success and Federal Acquisition Regulations (FAR) Subpart 37.601, the USACE has a number of Performance Based Contracts (PBC) available for our customers. Performance-based contracting methods are intended to ensure that required performance quality levels are achieved and that total payment is related to the degree of services performed that meet contract standards. PBCs will describe the requirements in terms of results required rather than the methods of performance of the work; use measurable performance standards and quality assurance surveillance plans; specify procedures for reductions of fee or for reductions to the price of a fixed-price contract when services are not performed or do not meet contract requirements; and, include performance incentives where appropriate.

Some contracts are specific to the job, others are indefinite delivery/indefinite quantity (ID/IQ) with the flexibility to issue task orders specific to the job. These features are described below:

4.2.1. Negotiation. Negotiation is one of two major methods of arriving at a price for a project. The second method is the normal sealed bidding method that requires that contracts be awarded to responsive and responsible offerors only on the basis of price and price-related factors. Negotiation can be utilized with competitive or other-than competitive proposals. Any contract awarded without the use of sealed bidding is a negotiated contract. The key benefit of the negotiated contract is that it is a flexible, but orderly, procedure that includes the receipt of proposals from offerors, permits bargaining, and usually affords offerors an opportunity to revise their offers before the award of a contract. Negotiation is used for both fixed price and cost-reimbursable contracts.

4.2.2. Contract Pricing. Contract pricing arrangements can either be fixed price or cost-reimbursable. If the nature and quantity of unknowns is such that a fixed price contract can not be defined, the contractor's accounting system is adequate for the determination of costs applicable to the contract, and the government surveillance during performance will be such to provide reasonable assurance that efficient methods and cost controls are used, then a cost-reimbursable contract can be used.

4.2.3. Indefinite Delivery/Indefinite Quantity Contracts. Indefinite delivery/indefinite quantity (ID/IQ) contracts are basic contracts against which task orders are issued. The task orders are issued and treated as separate projects. Basic contract management procedures or advance agreements may govern matters related to all task orders under the basic contract. Dollar ceilings are established for the total value of all task orders to be issued and can be established for individual task orders.

4.2.4. Major Environmental Contracts. Although USACE utilizes many different contract strategies to execute its HTRW missions, Table 4-1 compares and contrasts the unique contracts for remediation services which have proven to be especially effective in dealing with the uncertainties of Environmental/HTRW work:

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Table 4-1
Major Environmental Contract Types and Features

Contract	ID/IQ or project specific	Ceilings	Limitations on Use	Contract Pricing	Authority Delegated to Field
Invitation for Bid	Project Specific	None – determined by bid	Construction/ Remediation only	Firm Fixed Price	Administrative Contracting Officer (ACO)
Preplaced Remedial Action Contract (P-RAC)	ID/IQ	Typically $50 M ceiling Typically no task order limit One year base contract with four 1-yr options	Construction/ Remediation Services only (only incidental A-E services)	Cost-Reimbursable - with - Fixed Fee, Award Fee or Incentive Fee - or - Fixed Price	ACO, unless service, then Contracting Officer's Representative (COR) only
Comprehensive Environmental Contract (CEC) (Note: CEC contracts existing in three (3) categories: large firm; small firm; and 8A/Small Business. See ceilings for applicable amounts) CEC contracts also have a Performance Based Contracting (PBC) option.	ID/IQ or MATOC (Multiple Award Task Order contract: usually competed among three firms.)	Typically greater than $200 M Typically no task order limit Five Year Period of Performance	Cradle to Grave Investigation, Design, Construction/ Remediation Services/Environmental Services also	Cost-Reimbursable - with - Fixed Fee Award Fee or Incentive Fee Or Fixed Price	COR

Table 4-1
Major Environmental Contract Types and Features

Contract	ID/IQ or project specific	Ceilings	Limitations on Use	Contract Pricing	Authority Delegated to Field
Multiple Award Remediation Contract (MARC)	ID/IQ	Collective ceiling is established for multiple contracts. i.e., One award could be $100 M for four contracts. One contractor could get the bulk of that.	Construction/ Remediation Services only (only incidental A-E services)	Cost-Reimbursable - with - Fixed Fee Award Fee or Incentive Fee - or - Fixed Price	ACO, unless Service, then COR only
Small Action Remedial Tool Contract (SmART)	ID/IQ	Less than $3M contract ceiling $500,000 or no task order limit One two year base with one three year option	Remediation Services only (only incidental A-E services)	Firm Fixed Price	ACO, unless Service, then COR only
Rapid Response	ID/IQ	Typically $50M Typically no task order limit	Emergency or Time Critical Investigation, Design, Construction/ Remediation Services	Cost-Reimbursable with Fixed Fee Or Fixed Price	None, retained in Omaha

Table 4-1
Major Environmental Contract Types and Features

Contract	ID/IQ or project specific	Ceilings	Limitations on Use	Contract Pricing	Authority Delegated to Field
Service	ID/IQ	Varies extensively	Drilling, Analytical services, Sampling, Geophysical services, also used for RI/FS, design work	Fixed price Or Cost-Reimbursable	COR
Time and Materials	ID/IQ	Varies by contract	Typically has been used for Ordnance Removal or emergency situations	Reimbursement of labor at fixed hourly rates (which include profit) and cost only for material	ACO, unless service, then COR only
Fixed Price Remediation with/without insurance (subset of PBCs).	ID/IQ	Nationwide contracts: 1 Stand-alone Env Remed. Svcs (ERS)/Const ($200M) & Multiple Award Remed Contr (MARC) [3 large firm contract with $200M capacity and 3 small business contract with $100M capacity]	Environment-al Services – (Which can include construction activities)	Fixed price	Available to all USACE Corps Districts (Can support various customers: Army, AF, EPA, others)

5. Documents and Records

Proper documentation is another key component of an effective quality control process. Significant comments, issues, and decisions are recorded and the entire process leaves a clear audit trail. The documentation of the independent technical review and other quality control processes prescribed in a product's QCP is included with the submission of a specific product to the HTRW-CX. For those products that the function chiefs transmit to their respective MSC, the functional chief shall certify that the quality control process for that product has been completed and that all technical issues that have been identified have been resolved. For those products that the District Commanders transmit to their respective MSC or to headquarters, both the chief of the functional element responsible for the product and the District Commander shall sign the certification. Copies of the certification and accompanying documentation are included in the District project files. The HTRW Center of Expertise (CX) monitors chemical Quality Assurance Reports and Chemical Data Quality Assessment Reports from all projects. The CX is responsible for a 10% review of these reports and also receives an electronic version of each report that facilitates archival maintenance of these documents.

5.1 **Recordkeeping Procedures.** The Army Records Information Management System (ARIMS) is the Army recordkeeping system used to properly manage information from its creation through final disposition, according to Federal Laws and Army recordkeeping requirements. It provides life cycle management instructions for the systematic identification, maintenance, storage, retirement, and destruction of Army information recorded on any medium. It ensures the commander and staff have the information needed to accomplish the mission; that they have it when and where they need it; that they have it in a useable format; and that it is created, maintained, used and disposed of at the least possible cost. Within ARIMS, records are identified and filed under the number of the primary directive that prescribes those records be created, maintained, and used. The file number identifies the documents for filing and retrieval, reference and legal disposition. All folders and containers used to store official records are labeled which include the file number, file title, Privacy Act system notice number (if applicable), and the disposition instructions. The normal flow of records is from the office files, through the organizational and installation information management channels, to a records holding area for a short period of storage, then ultimately retired to a Federal Archives and Records Center. SF 135 (Records Transmittal and Receipt) and SF 135A (Records Transmittal and Receipt Continuation) are prepared for the documents and describe the records in enough detail to permit quick retrieval of specific documents. A separate SF 135 is prepared for each shipment of records.

5.1.1. ARIMS Filing Categories. The following ARIMS file categories are used to identify Superfund records:

File Category	File Category Description

5	Management
37	Financial Administration
200	Environmental Quality
385	Safety
405	Real Estate
415	Construction Contracts (Military) (DERP Files Only)
715	Procurement Contracts
1110	Corps of Engineers Engineering and Design
1180	Corps of Engineers Contracts (Civil)

HQUSACE is working with the National Archives and Records Administration (NARA) on the approval of new filing numbers to identify environmental records. These new numbers are subsets of the listed file categories above.

5.1.2. ARIMS Requirements. Each District and MSC has a designated Records Officer who is knowledgeable about local policies, standards and procedures regarding files and recordkeeping. The Records Officer provides specific information and assistance regarding archiving of records.

5.1.3. Identification And Retrieval Of Environmental Records. In order to identify and retrieve environmental records, SF135s boxes and labels are clearly marked to reflect the name of the environmental program such as Superfund, and contain a statement that reads "DO NOT DESTROY" based on the continued moratorium on destruction of environmental restoration records in effect since 1991. The documentation describes the records in sufficient detail to permit quick retrieval when needed.

5.1.4 Electronic Storage. Currently, the USACE has no guidance on long-term storage of data in electronic format. However, the USACE is currently developing this guidance. There is no scheduled release date for this guidance.

5.2. **Functional Proponents For Superfund Records.** The following lists and identifies USACE functional proponents and the records they are responsible for safeguarding. This list may also be used to identify functional proponents to safeguard records to support remedial design and remedial action for the Defense Environmental Restoration Program (DERP). USACE uses these guidelines to ensure consistent maintenance of all applicable documents for EPA projects.

5.2.1. Roles And Responsibilities. The following functional proponents have been identified as the "Office of Record" for Superfund records and are being implemented throughout USACE. The functional proponents are responsible for creating, filing, identifying, and maintaining the records required supporting the documentation and costing recovery effort required by the Superfund Amendments and Reauthorization Act (SARA). Proponents have the responsibility of identifying the ARIMS file number when writing a document or placing the file number along the right-hand edge of documents not identified with a file number at the time of creation.

This is not an all-inclusive list and other documents critical to support cost recovery may be included. Anything maintained in these files is subject to full disclosure in a court of law. Any memo or telephone record which represents a personal opinion of an event, person, or thing is removed from the file before they are sent to a records holding area. Records, such as contracts and invoices, do not need to be permanently stored in the technical files. The District Contract Office has responsibility of maintaining the contract files for a particular site and the District Resource Management Office has responsibility for maintaining invoices and receiving reports.

To the greatest extent possible progress reports and correspondence are filed in chronological order. When these files are no longer needed to support a particular phase the files can be transferred to a records holding area and retrieved if needed.

Working Files - Records used in the process of design or construction as working files need to be identified as working files. At the end of an identified period, these files can be purged of duplicative material. The identified functional proponents have the responsibility to safeguard permanent files for record retention (as outlined below).

5.2.1.1. Functional Proponent Outline.

A. Project Management Division (Files):
A record of all the Project Managers assigned to a particular project during its life is created and maintained. This record will consist of:

+ Project Manager and the period of time he or she worked on the project
+ Forwarding Addresses of project managers if departed from the organization
+ Project Management Plan
+ Project Budget and Schedules
+ Monthly Progress Reports
+ Internal and external correspondence relating to the site.

B. Engineering Division (may be combined with other MSCs):
Pre-Design / Design documents
Plans and Specs
As builts
Environmental Assessment
QA reports for chemical testing
Meeting minutes with the RD contractor
Contractor evaluation reports
Trip reports
Cost estimates
Site Specific Safety and Health Plan
Meeting minutes and correspondence with state and local regulators

C. Value Engineering (may be located in Engineering or Construction Division):
Results and recommendations of VE studies.

D. Construction (if/when items are applicable) (may be combined with other MSCs):

Biddability, Constructibility, Operability, and Environmental (BCOE) Review
Progress Reports
Inspection reports
Monitoring and sampling data
Field logs
Internal and external correspondence
Minutes of any coordination or public participation meetings
Quality Assurance Plan
QA reports for chemical testing
Site Specific Safety and Health Plan
Notes from meetings with the contractor
Originals and come back copies of manifests
Performance Evaluations
Deliverables required by statements of work with contractors
Newspaper articles, videos, pictures of the site
QA reports during the execution phase
Meeting minutes and correspondence with state and local regulators
OSHA Monitoring and Sampling Data

E. Contracting Division:
Government cost estimates
Abstracts of bids
Accepted and unsuccessful bids
Notices to proceed
Signed executed contract
Change orders and modifications
Start and stop orders
Contract property accounts
Wage rate and labor problems
All other documents determined by the contracting officer as essential for completion of the individual contract.
Contract correspondence
Documents relating to the close out of the contract

F. Real Estate Division:
Rights of Entry
Title Search
Land Grants/Deeds
Land Lease/Property Purchase

G. Safety and Occupational Health Office:
Accident and Investigation Reports for Contractors and Government Employees
OSHA Violations

H. Resource Management Office:
The financial records consist of all documents substantiating cost to a project. This is the most critical piece in the documentation process. For a document to be admissible, three conditions are met:

I. The documents must show the relationship between the cost being incurred and the project charged;
II. The documents must be properly authorized by an individual delegated with that authority;
III. There must be proof of disbursement.

The migration to Corps of Engineers Financial Management System (CEFMS) does not diminish the Corps responsibility to maintain cost documents generated by Corps of Engineers Management Information System (COEMIS). The following is a list of the different types of cost records for which the Resource Management Office continues to be responsible:

COEMIS Records:
Interagency Agreements
Certified labor documents
Working papers used to establish Overhead, Indirect and Burden rates
Effective rate computations
Travel documents to include travel order, reimbursement voucher, traveler receipts, ENG 4480
Contract pay estimates (ENG 93), certified by the COR and associated ENG 4480s
Other contractual obligations to include purchase orders, imprest fund vouchers, credit card purchases and associated invoices, receiving reports, and ENG 4480s.
Motor Vehicle Charges (vehicle logs and distribution vouchers)
Reproduction costs (DPA print requests and distribution vouchers)
Laboratory costs (work order and distribution vouchers)
Cost transfers requests and ENG 4479/ENG 4480 support documents
Disbursement vouchers to include signatures and check numbers

CEFMS Records:
Interagency Agreements
Working papers used to establish Overhead, Indirect and Burden rates if the rates are not computed using the CEFMS Budget Module
Effective rate computations
Travel vouchers and supporting documentation including receipts
Contractor Invoices
Cost transfer requests

5.3. **Technical Guidance Documents**. USACE publications are used Corpswide to promulgate directive, administrative, technical, instructional, and other types of information. These publications include Supplements to Department of Army

Regulations, Engineering Regulations (ERs), Engineering Circulars (ECs), Engineering Pamphlets (EP), Engineering Manuals (EM); Office Memorandums (OM), Engineer Technical Letters (ETL), and Miscellaneous Publications such as Charts, Design Guides, ENG Maps, Plans, Posters and a limited number of unnumbered publications (UN). HQUSACE develops guidance and implementing instructions with technical assistance from the Centers of Expertise and makes this information available to the MSCs and Districts. Most of the publications are coordinated with the MSCs, Districts, and Centers of Expertise prior to finalization and issuance. The use of these standard publications helps to ensure all Corps entities are performing work in a standardized and uniform manner.

5.3.1 Updates and Revisions. Whenever one third or more of a publication is in need of updating, publication will be revised, that is reviewed in its entirety, reorganized if necessary, and rewritten as appropriate. The format of the publications is standardized as well as the organization of the publication (i.e. table of contents etc.). Changes can be issued to loose-leaf publications of 10 pages or more when less than one third of the loose-leaf publication is in need of updating. Loose-leaf publications of less than 10 pages will simply be revised. Errata sheets are used as a simplified means to correct single, minor errors/omissions, detected after a document has been published and considered important enough to warrant immediate correction.

5.3.2 Distribution and Availability. The Corps has established an Electronic Publications Library on the INTERNET as the official HQUSACE publication repository. This website www.usace.army.mil/inet/usace-docs/ is the only repository for all **official** USACE engineering regulations, circulars, manuals, and other documents originating from HQUSACE. The publications are provided in portable document format (PDF) and ensures the most current guidance is available to all Corps entities. As of 22 July 1998, HQUSACE ceased printing "official" HQUSACE publications (regulations, circulars, pamphlets, technical letters, manuals, etc. described in paragraph 5.3.3). Some publications with complex information content, unique use and/or diverse audiences may still be printed and distributed. To ensure all USACE elements receive timely notification of the issuance of official publications, HQUSACE Publication Bulletins are distributed by e-mail to all Commanders/Directors, Major Subordinate Commands (MSCs), Laboratories, and Field Operating Activities; Directors and Chiefs of Separate Offices; Directors and Chiefs of Information Management; and Records Management. HQUSACE Publication Bulletins are sequentially numbered and dated so that organizations may verify receipt of all notifications. New and/or revised HQUSACE publications issued within the past 180 days are also listed in a New/Revised HQUSACE Publications Index on the INTERNET. The Corps also has libraries that provide employees electronic access to information as well as physical collections of materials. Some of the libraries are regional and serve MSCs and Districts.

5.3.3. Types of Publications. A variety of publications are used to disseminate information, policy, guidance, etc. throughout USACE. Several of these publications are listed and defined below.

+ Engineering Regulations (ER). ERs contain policies, responsibilities and procedures of continuing nature, prescribed exclusively for the Corps of Engineers mission.
+ Engineering Circulars (EC). ECs may contain information parallel to ERs, i.e., be directive in nature, with the difference that applicability will be transitory (one-time occurrence or otherwise temporary). ECs remain active for no more than two years from the date of issue. They bear an expiration date position above the EC title that reflects the last day of the quarter, i.e. 31 March (year), 30 June (year), 30 September (year), or 31 December (year). If after two years the guidance of a circular is still valid, it must be republished in an ER. ECs may also be used as transmission or rescission documents.
+ Engineering Pamphlets (EP). EPs contain functional procedures, instructional guidance, or reference information of a continuing nature.
+ Engineering Manuals (EM). EMs contain technical guidance of a continuing nature concerned primarily with Engineering and Design projects
+ Office Memorandums (OM). OMs contain directive and procedural information necessary to carry out specific staffing functions. OMs are for HQUSACE/OCE personnel only.
+ Engineer Technical Letters (ETL). ETLs contain "advance information" on design, engineering and construction of projects. They are considered intermediary publications that will eventually be republished in more permanent media, such as ERs or EMs. ETLs cannot be used to amend or replace regulations or circulars.
+ Policy Memorandums can be issued and distributed on an "as needed" basis to provide interim policy until incorporation into an ER. Two of these memorandums currently pertain to environmental projects: CEMP-RT Memorandum dated 26 Oct 1998, Subject: Sample Collection and Preparation Strategies for Volatile Organic Compounds (VOCs) in Solids, and CEMP-RT Memorandum dated 23 Nov 1998, Subject: Interim Chemical Data Quality Management (CDQM) Policy for USACE Hazardous, Toxic and Radioactive Waste (HTRW) Projects.

In addition to the above, USACE originates a number of miscellaneous publications. These include charts, design guides and specifications, ENG Maps, plans, posters and a limited number of unnumbered publications (UN). Generally, the format, preparation, applicability and availability of these publications are solely a proponent's choice, with the USACE POC together with the Printing and Publishing Branch providing the required support for printing and distribution. The Printing and Publishing Branch involvement in these publications is largely limited to numbers assignment and tracking for index and distribution purposes.

Corp of Engineers Guide Specifications for Construction (CEGS) were superceded by Unified Facilities Guide Specifications (UFGS), effective March 2001. UFGS are a joint effort of the USACE, the Naval Facilities Engineering Command (NAVFAC), and the Air Force Civil Engineering Support Agency (AFCESA) to unify all design and construction technical criteria within the Department of Defense. Military departments

are in the process of converting most of the existing facility-related handbooks, design manuals, engineering manuals, and technical manuals into Unified Facilities Criteria (UFC) documents. UFC documents provide planning, design, construction, operations and maintenance criteria, and apply to all service commands having military construction responsibilities. The UFC documents are used for all service projects and work for other customers where appropriate. UFGS are published only in electronic format and are intended to be used with SPECSINTACT software. SPECSINTACT software is the official means the USACE uses to produce and maintain guide specifications. Additional information can be found at the following web site www.hnd.usace.army.mil/techinfo/ and accessing the guide specifications link.

6. Computer Hardware and Software

6.1. **Organizational Policy**. It is the policy of USACE to promote the widest acceptance and broadest perspective in the development of Corps information resources and to assure that data collected, analyzed, processed, and maintained on all automated data processing systems, in support of USACE programs and functions be accurate and of sufficient integrity to support effective quality management as established by USACE Information Resources Management (IRM) Program. All USACE activities have a local Information Resources Management Steering Committee (IRMSC) or equivalent.

There is no in-house software development in the environmental programs at this time. All of the programs used are either commercial off the shelf (COTS) software or programs that are made available by the Environmental Protection Agency, the Air Force, the Army, or other agency. COTS software is generally purchased at the request of the customer or because it is widely used by the Corps of Engineers.

Information Management Offices within each MSC and District are responsible for validating and approving the requirements for the purchase and maintenance of all hardware and software. They also ensure that applicable Information Resource Management (IRM) requirements and standards are met.

Corporate automation information systems (AIS) for project and financial management are used to manage each project and program. Developing, defending, and maintaining budgetary data and all other information necessary to manage a project is the responsibility of the PM. Supervision of this process, along with development and maintenance of all program data and oversight of the AIS, is the responsibility of the District's Deputy for Programs and Project Management (DPM). The DPM will also supervise the aggregating of program and project data so as to facilitate review and management recommendations by the District/MSC senior staff, and informed decision-making by the Commander.

6.1.1. Automated Management of Comments. ER 1110-1-8159 (ref. 1.1.3.v.) mandates the use of DrChecks (Design Review and Checking System) replacing the Automated Review Management System (ARMS) as the USACE automated comment management system. DrChecks is a Web-based product developed to improve the design review process. The Corps and several other federal agencies are using the software developed at the Corps' Construction Engineering Research Laboratory in Champaign, Illinois to manage design reviews on hundreds of new construction projects. DrChecks

links designers, reviewers, project managers and other interested parties via the Internet to track the review of construction plans and specifications. The software provides an effective and economical means of compiling and assembling comments from all reviewing elements, coordinating comments by deleting inappropriate or duplicate comments, and back checking to ensure proper resolution.

6.1.2. Use of Automated Data Processing Systems.

6.1.2.1. The USACE HTRW Lessons Learned System is a computer-based system that has been designed to facilitate the exchange of information among multidisciplinary USACE elements with execution responsibilities in the Environmental Restoration arena. This system provides a means to identify real or potential problem areas in the HTRW program, collect ideas on solutions to these problems, and to make the information available to all USACE Commands engaged in this work. The system relies primarily on the electronic transfer of data to identify problem areas and collect corresponding ideas and solutions to distribute to system users. The HQUSACE Environmental Community of Practice implements and maintains the system. Engineering and construction personnel use personal computers to access the central file.

6.1.2.2. Architect-Engineer Contract Administration Support System (ACASS) is an automated database of A-E qualifications, DOD A-E contract awards, and A-E performance evaluations. It is maintained and operated by the Contracting Division of the Portland District. ACASS is used primarily by DOD agencies but other Federal agencies may transmit evaluations to ACASS and access information in ACASS. ACASS fulfills Federal Acquisition Regulation requirements eliminating the responsibility for individual offices: to maintain files on firms wishing to be considered for Government contracts; classify each firm with respect to location, specialized experience, professional capabilities and capacity; maintain records on contract awards in the past year; maintain performance evaluation files; and distribute performance evaluations to all contracting offices.

6.1.2.3. Construction Contract Appraisal Support System (CCASS) is a centralized and automated data base containing performance evaluation information on DOD construction contractors. The standard form SF 1420, Performance Evaluation – Construction Contracts, is electronically transmitted to the CCASS central data base, which is maintained in Portland, Oregon in accordance with criteria established in DFARS 236.201. This software program is designed to assist the construction field office in preparing the Standard Form 1420 and electronically distributing the forms to the District office and the centralized data base. This program requires some knowledge of personal computers and telecommunication facilities.

6.2. **Information Systems Modernization Program (ISMP)**. The Corps of Engineers has a multi-year management effort underway to replace outmoded software and applications. It is a commitment to improve the business processes and the automation, which are at the heart of our mission. The HQUSACE Information Systems Modernization Program (ISMP) is composed of several systems (described below)

including Corps of Engineers Financial Management System (CEFMS), Project Management System (P2), and Resident Management System (RMS). P2 is the tool (AIS) that enables USACE to implement its business process and to change its desired Project Management Business Process (PMBP) culture. USACE is committed to accomplishing work through project-focused teams, using proven project management practices. The ISMP evaluates all major software systems used by the Corps of Engineers with the goals of reducing the cost of data collection; verifying and improving processing; reducing the cost of system design, development, and maintenance; and improving the accuracy, completeness, availability, timeliness, and usefulness of information for operation users and decision makers at all levels and across all functional boundaries.

6.2.1. CEFMS. Corps of Engineers Financial Management System (CEFMS) is the business management system used by all Corps offices. CEFMS allows the Corps to manage their work, resources, and funding more efficiently by replacing multiple systems previously used such as Corps of Engineers Management Information System (COEMIS). The system provides immediate, real-time responses for commitment, obligation, labor, and other transactions. CEFMS also has the capability to generate reports regarding funding expenditures. Electronic signature capability allows managers to convey their approval or authorization quickly and securely. The CEFMS environment has multi-level processing with system to system networking capabilities. The programming and databases are maintained in centralized locations under secure environments. Access to the database information is strictly protected with numerous passwords and other security features.

6.2.2. P2. P2 is a suite of commercial-off-the shelf (COTS) software applications configured to support project execution in the Military, Civil Works, Environmental, Research & Development and Interagency and International Services (IIS) mission areas in Phase I of its deployment.

The ultimate goal is to manage all project and program work through P2. Phase II of the PMBP Manual and P2 initiatives will include increasing the user friendliness of P2 and creating additional interfaces between USACE legacy systems and P2 in accordance with evolving business processes.

Previous software systems such as PROMIS, were deployed without standard business processes. P2 is different in that it is the enabling tool for the new USACE business processes. The P2 system functionality is being configured in a way that keeps the focus on delivering the best tools to the Project Delivery Team (PDT), including Virtual Teams, to support project planning and execution while also supporting programmatic processes, Regional Business Centers and corporate data needs at all levels of the organization as a by-product.

6.2.3. RMS. The Resident Management System (RMS) is an automated construction-management/quality assurance information system that is PC-based, LAN-compatible, and primarily oriented to the daily requirements of USACE field-level construction managers. Its primary features include capabilities to support construction

project planning, contract administration, quality assurance, payments, correspondence, submittal management, safety and accident administration, modification processing, and management reporting. RMS is seen as a powerful, automated management tool to increase staff productivity and help ensure construction quality of projects. Upon completion of development, RMS has the capability of communicating with other USACE automated information systems such as P2 and CEFMS.

7. Planning

The US Army Corps of Engineers' (USACE's) goals for site investigation, remedial design, and remediation are to deliver quality investigation, engineering design, and remediation efforts on schedule and within budget without compromise to health and safety. These goals challenge MSCs and Districts to continue striving for better, safer, faster, and cheaper completion of work activities and site closeout.

7.1. **Health and Safety**. The MSCs and their respective Districts and follow the requirements in ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) Activities (ref 1.1.3.o). The ER defines roles and responsibilities of USACE safety and occupational health staff at the HTRW design district, construction district and the HTRW-CX. The goal is to assure that safety and occupational health is cost effectively planned for (designed into projects) and implemented in the field while performing HTRW site investigations and remedial action construction. EM 385-1-1, "Safety and Health Requirements Manual", simultaneously cover contractor operations. The plans address all applicable regulatory requirements in accordance to 29 CFR 1910.120(i)(2) – Occupational Health and Safety Administration, Hazardous Waste Operations and Emergency Response; 29 CFR 1926, OSHA, Safety and Health Regulations for Construction; 29 CFR 1926.65, OSHA, Hazardous Waste Site Operations and Emergency Response; US EPA Occupational Health and Safety Manual; USACE Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste and Ordnance and Explosive Waste Activities, ER 385-1-92 (ref. 1.1.3.o.); and USACE Safety and Health Requirements Manual, EM 385-1-1 (ref. 1.1.3.h.). The SSHP provides site background discussions and describes personnel responsibilities, protective equipment, safety and health protocols, decontamination procedures, personnel training, emergency response contingency plan, and type and extent of medical surveillance. Accident prevention plans are also incorporated into the SSHP. The plans identify problems or hazards that may be encountered and how these are to be addressed. Procedures for protecting third parties, such as visitors or the surrounding population, are also provided. The plans are reviewed and approved by the District/project industrial hygienist and District Safety Officer. For in-house work, the Safety Officer approves the plan. For contractor work, the SSHP is approved by the contractor and accepted by the Contracting Officer's Representative.

7.2. **Technical Project Planning Process**. USACE has developed a four-phased effort, called Technical Project Planning (TPP) process, to design data collection programs (ref. 1.1.3.d., EM 200-1-2, Technical Project Planning (TPP) Process). The TPP process

ensures efficient progress to site closeout by challenging the project delivery team to do the following:

+ Focus on site closeout during all project planning and execution efforts.
+ Consider all existing environmental data and site information.
+ Understand short- and long-term Customer goals.
+ Obtain the Regulator's input.
+ Recognize applicable regulations and related decisions required for progress to site closeout.
+ Identify the environmental data type(s) needed for the site-specific engineering and scientific evaluations.
+ Determine the data quantity and quality requirements based solely on the intended data use(s).
+ Develop data collection options for the Customer's consideration.

The technical project planning (TPP) process involves a number of phase-specific activities. The TPP process supports efforts to prepare project specific DQO statements that meet the definition of a DQO as provided in EPA's 7-Step DQO process (EPA QA/G-4). The 7-step DQO process and the TPP process are the planning tools for Environmental sites within EPA's and USACE's quality management systems, respectively. As planning tools, both processes are intended to ensure data are of the type, quantity, and quality needed for decision making at Environmental Restoration sites. The TPP process is a critical component of the USACE quality management system that meets the American National Standard for planning the collection and evaluation of environmental data (ANSI/ASQC E4). E4 is a national consensus standard for quality systems responsible for environmental data collection and environmental technology programs.

a. Phase I (Identify Current Project)

Phase I activities bring together decision-makers and technical personnel to determine an overall site approach and identify the current project focus for the specific product, service, or site activities.

b. Phase II (Determine Data Needs)

Phase II activities offer guidance to assist "Data Users" with the detailed planning required to identify and document data needed for the current project, and subsequent executable stages at the site. Phase II helps Data Users determine the level(s) or categories of acceptable data quality required for the intended purpose or use of every data need. The required quality of analytical data to be collected is dependent on the data use. The two descriptive data categories employed in this process are screening data with definitive confirmation and definitive data (both as defined by EPA).

c. Phase III (Develop Data Collection Options)

Phase III efforts of "Data Implementors" develop approaches for sampling and analysis activities that will fulfill the data needs of Data Users, within the constraints of the project.

d. Phase IV (Design Data Collection Program)

Phase IV activities involve Customer selection of data collection components that best meet the Customer's goals for the product, service, project, etc. During this phase, the technical planning team prepares a detailed DQO for each data need, and finalizes related work plans or scopes of work.

Some key concepts of the technical project planning process are:

1) Site Closeout. Site closeout is achieving the "walk away goal", or the final condition of an Environmental Restoration site, as envisioned by the Customer, Regulator, and TPP team.

2) Customer's Goals. Includes identifying, understanding, and communicating the customer's concept of site closeout and their schedule and budget constraints.

3) TPP Team. Technical project planning teams consist of Decision-Makers, Data Users, Data Implementors, and other project-specific technical specialists needed to achieve the customer's goal.

4) Project Objectives. Project Objectives are the short- and long-term issues to be addressed and resolved at an Environmental Restoration site. Satisfying or resolving the project objectives and the underlying regulations or site decisions are the purpose of all site activities. Most project objectives are a consequence of the regulations applicable to the site restoration process.

5) Data User Perspectives. Data users are the technical personnel responsible for engineering and scientific evaluations that are the basis for site decisions. Data users determine the data needed to satisfy project objectives.

6) Data Implementor Perspectives. Data implementors (e.g., chemists, engineers, geologists, scientists, etc.) identify the sampling and analysis methods suitable for satisfying the data needs determined by the Data Users.

7) Data Collection Options. Data collection options are different groups of data needs and their associated sampling and analysis methods. Data collection options provide a simple mechanism to document the "basic" data needed for the current project; "optimum" data that is cost-effective and prudent to collect for future executable stages; and any "excessive" data that others, besides the Data Users, impose or mandate in excess of the data needed by Data Users.

8) Data Quality Objectives (DQOs). "DQOs are qualitative and quantitative statements derived from the DQO process that clarify study or project objectives, define the appropriate type of data, and specify the tolerable levels of potential decision errors that are used as the basis for establishing the quality and quantity of data needed to support decisions" (EPA QA/G4). DQOs produced as a result of the TPP process meet EPA's definition (of a DQO). The DQOs documented during The TPP activities are project-specific statements that describe the data needed, the intended uses of the data, and the sampling and analysis methods to achieve acceptable data quality for the intended data uses. When a Data User defines a probabilistic-type of data need, Steps 5 through 7 of EPA's 7-Step DQO process are used to determine the number of samples required for the intended data uses. Application of probabilistic methods can only be accomplished when all of these three conditions exist: when a precise study question is defined; the Customer and lead Regulator have established tolerable limits on decision errors; and the support of a qualified environmental statistician is available to work on the project.

8. Implementation of Work Processes for Environmental Data Collection and Construction

8.1. Environmental Chemistry and Geotechnical Data Collection.

8.1.1. Introduction. Execution and implementation of engineering and construction activities of the US Army Corps of Engineers (USACE), including the implementation of our Chemical and Geotechnical Data Quality Management (CDQM/GDQM) programs for data collection, in Hazardous, Toxic, and Radioactive Waste contamination related products and services requires the interface and coordination of several USACE personnel. Procedures and responsibilities for USACE staff performing government CDQM and GDQM activities are defined in this section and detailed in ref. 1.1.3.f., (EM 200-1-6, Chemical Quality Management for HTRW Projects) and 1.1.3.u, (ER 1110-1-8157, Geotechnical Data Quality Management for Hazardous Waste Remedial Activities). Policies, guidance and requirements for geospatial data and systems are defined in ER 1110-1-8156 and EM 1110-1-2909. Under ER 1110-1-8156, (ref. 1.1.3.t), offices are required to document new data sets using the Federal Geographic Data Committee's Content Standard for Digital Geospatial Metadata (revised June 1998). Construction activities are discussed briefly (and associated references listed) in some of the sections (8.8.3., 8.10, et al). The respective USACE project manager (PM) is responsible for initiating and coordinating the defined CDQM and GDQM activities. The project specific Quality Assurance Project Plan details the chemical data quality management for each project and activities are implemented as described in the plan. Electronic management of environmental data collected during the execution of projects is the responsibility of individual Districts. This data includes chemical and geotechnical data related to specific projects. While there are no current requirements to manage this data using electronic measures (database entry, scanning, etc.), the use of such measures is highly encouraged using the Tri Service Spatial Data Standards or the Army's Environmental Restoration Information System (ERIS). It is recommended that for critical, high profile, or large projects, electronic data management for sampling and analytical data are encouraged.

8.1.2. Goals of the CDQM Program. The goals of the USACE CDQM program are to 1) generate data of acceptable quality for the intended use, 2) satisfy the needs of the customer and the regulators, 3) generate sufficient data of known quality on the first attempt, and 4) provide a historical record for potential future use. When CDQM is used properly, the PM can readily measure the success of the project delivery team in meeting the project-specific data quality objectives (DQOs). The USACE CDQM program consists of activities presented in ER 1110-1-263 Chemical Data Quality Management for Hazardous Toxic and Radioactive Waste Remedial Activities (ref. 1.1.3.r.), Engineer Manual (EM) 200-1-1 Validation of Analytical Chemistry Laboratories (ref. 1.1.3.c.), EM 200-1-2 Technical Project Planning Guidance for HTRW Data Quality Design (ref. 1.1.3.d.), EM 200-1-3 Requirements for the Preparation of Sampling and Analysis Plans (ref. 1.1.3.e.), and EM 200-1-6 (ref. 1.1.3.f), Chemical Quality Assurance for HTRW Projects.

8.1.3. Technical Project Planning. Each District is responsible for assessment of chemical and geotechnical data quality, including determination of data usability and DQO attainment. The project chemist and geologist are critical team member for this effort, and are involved in preparation and review of project documents including scopes of work, sampling and analysis plans, contract specifications, and final chemical and geotechnical data reports. The project chemist and geologist are involved at each step of an environmental restoration project, so that adequate data quality is maintained. The technical project planning process for design of DQOs is discussed in the Planning section above and described in detail in EM 200-1-2 (ref. 1.1.3.d.) and ER 1110-1-8157 (ref.1.1.3.u.).

8.1.4 Chemical and Geotechnical Data Quality Management (CDQM/GDQM) Activities. All environmental restoration projects require a comprehensive and multifaceted approach to quality control (QC) and quality assurance (QA) in order to achieve and document attainment of appropriate quality for the intended data usage. The project chemist and geologist are the focal points to ensure that chemical and geotechnical data meet data quality objectives for each environmental restoration project. The project chemist and geologist have several techniques to monitor and ensure the quality of chemical and geotechnical data. The project chemist and geologist in conjunction with the technical project team determine the appropriate level of compliance monitoring as discussed in ER 1110-1-263 (ref. 1.1.3.r.) and ER 1110-1-8157 (ref 1.1.3.u.). This determination is based upon the intended use of the data and the level of confidence needed in the quality of the data. Monitoring of data quality may consist of a combination of activities. The twelve (12) compliance monitoring activities that the Corps of Engineers apply on a project-specific basis to assist in generating data of known quality include: (1) technical document review; (2) validation of primary and QA laboratories; (3) sample handling quality assurance; (4) quality assurance sample collection and analysis; (5) data review in the form of a CQAR; (6) assessment of data usability in the form of a CDQAR; (7) single- or double-blind performance evaluation sample analysis; (8) review of primary laboratory data; (9) validation of data; (10) field audits; (11) laboratory audits; and (12) tape audits. They are briefly described in some of the ensuing paragraphs and are fully described in EM 200-1-6 (ref. 1.1.3.f.).

8.1.5 Electronic Data Deliverable (EDD). Chemical and geotechnical data in electronic formats are preferred. For chemical data, a preferred format for reporting data by environmental laboratories is SEDD (Staged Electronic Data Deliverable), which is a program-neutral format that has been developed as a joint effort by the USEPA OERR Analytical Service Branch (ASB), and the USACE HTRW CX. Other equivalent and/or compatible EDDs may also be used as required for specific customers, projects, etc [except for the Formerly Used Defense Program (FUDS) which specifically requires the use of SEDDs].

Analytical data in SEDD format, which is based on an open industrial standard, eXtensible Markup Language (XML) that is fully compliant with the World Wide Web Consortium's (W3C) latest specifications, promote data exchange and integration for inter-agency programs.

The SEDD specification defines four stages for delivery of analytical data.
Stage 1 contains the minimum number of analytical data elements to convey results only data to the end users.
Stages 2a and 2b build on Stage 1 and adds methods and instrument QC data.
Stage 3 builds on Stages 1 and 2 and adds additional measurement data to allow for independent recalculation of reported results.
Stage 4 builds on Stages 1, 2, and 3 and adds raw instrument data files.
Commercial environmental laboratories capable of producing SEDD are likely able to produce Stage 2a for major environmental methods at this time.

Currently, ASB and USACE are working with offices from other agencies (DOE, Air Forces, etc.) to implement this format for delivery of environmental analytical data. USEPA ASB is providing a free tool to assist laboratories in creating EDDs based on SEDD. For additional information on SEDD, please contact Joe Solsky of the HTRW-CX (402-697-2573) or Anand Mudambi of EPA ASB (703-603-8796), and refer to the following web site: http://www.epa.gov/superfund/programs/clp/sedd2.htm

8.2. **Technical Document Review.** Environmental Restoration/HTRW Project Technical Verification Process. It is the responsibility of the contractor and the District to produce a quality product. Rather than employing multiple levels of detailed document review to ensure quality, the technical verification process transfers project responsibility to the District and its contractors. In general, the HTRW Design District is responsible for a QC review of the prime contractor's Quality Control Plan and all project-specific deliverables. Quality Control Plans, scopes of work, and other project documents completed in-house are reviewed by an independent technical review function established by the Design District. The MSCs provide QA oversight of their respective Districts' QC process. Districts may request HTRW-CX and OE-CX participation in a HTRW Design District's independent technical review process. The MSCs may also request HTRW-CX and OE-CX support in performing QA oversight and audits of their respective HTRW Design District's QC processes. HTRW-CX review is required on key documents of Category B projects (defined below). The HTRW-CX provides technical assistance and review of any project as requested by the HTRW Design District, MSC, or HQUSACE.

8.2.1. Environmental Restoration/HTRW Project Technical Categories. The HTRW Design District determines the appropriate review process for each environmental restoration project. Category A includes all routine environmental restoration projects, and all projects in the Preliminary Assessment phase and those beyond the Site Inspection (SI) or RCRA Facility Assessment (RFA) phase. Category A excludes, however, National Priorities List (NPL) sites, Base Realignment and Closure (BRAC) sites, sites where innovative technologies are used, and sites with construction estimates greater than $5 million. Category B projects include all non-routine projects, and any projects of special District, MSC, or HQUSACE concern.

8.2.2. Roles and Responsibilities for Review of Specific Environmental Restoration/HTRW Products. Review responsibilities will vary depending on the category (Category A or Category B) of projects. The HTRW Design District is responsible for

review and approval of all projects in Category A. Key documents for projects in Category B are reviewed and approved by the HTRW Design District and reviewed by the HTRW-CX. The PM provides appropriate technical documents to the HTRW-CX for their information or review. Technical review by the HTRW-CX will normally be completed within two weeks for a scope of work and within three weeks for all other documents from time of receipt. If shorter review times are required, the PM coordinates with the CX-District POC at the HTRW-CX (Note: A list of CX-District POCs can be found at http://www.environmental.usace.army.mil/org/cxpoc/cxpoc.html). Comments from the HTRW-CX are provided to the PM for all projects reviewed. A copy of all review comments and responses is placed in the permanent project file. Districts/centers with insufficient staff resources to provide in-house review rely upon the Design District, ERDC ECB, or the HTRW-CX for document review.

8.3. **Validation of Primary and QA Laboratories**. In general, commercial and QA laboratories that support the Environmental Restoration programs will obtain a USACE laboratory validation prior to field studies or sample analysis. The QA laboratory is defined as the USACE validated chemistry laboratory that is responsible for analysis of the project QA samples. For some data uses, other programs (i.e., State Fuel Storage Tank Program, A2LA, NELAP, United States Navy, and United States Air Force Installation Restoration Program Audits) can be utilized. Projects are not to be implemented without laboratory accreditation from some authority. Validation is maintained throughout the duration of the project. The USACE laboratory validation program is project-specific. The validation is a parameter, method, and matrix-specific approval. For each new contract or delivery order awarded during the validation period, a project-specific request for validation is sent to the HTRW-Center of Expertise (CX) for verification of laboratory status regardless of their expiration date on the list of validated laboratories. The primary objectives of the USACE validation program are to communicate to laboratories the USACE QA/QC requirements, verify the laboratories are performing specified analytical methods, and to ensure these laboratories meet the USACE requirements prior to sample analysis. Laboratory validations are performed by the HTRW-CX applying guidance outlined in EM 200-1-1, criteria found in the Shell Document for Analytical Chemistry Requirements (EM 200-1-3, Appendix I), and other project specific criteria. The USACE validation program is primarily based on EPA's SW-846 methods and the USACE guidance established in EM 200-1-3, Appendix I. The first step of the validation program is a paper review of the laboratory's capabilities to ensure that the proposed laboratory has the facility, equipment and personnel to perform the project required analyses. The laboratory demonstrates capabilities by providing acceptable Standard Operating Procedures (SOP) and successfully analyzing project required performance evaluation samples. The final step of the validation program is an on-site inspection of the laboratory's facility. Validation can be terminated at any step of the process due to inadequate laboratory documentation, performance, and/or execution.

USACE policy is under development to implement NELAP in the USACE Chemical Data Quality Management Program. This policy is implemented through a phased-in adoption of the DoD "Quality Systems Manual for Environmental laboratories", which is based on NELAP standards. NELAP accreditation of environmental testing

laboratories, for appropriate “fields of testing”, is to be a contractual base requirement for support of any USACE projects regulated under any EPA program. Consistent with ER 1110-1-263 (April 1998), district PMs and their technical support teams may elect to specify additional (i.e. alternative or supplemental) prequalification audit activities for environmental testing services to include additional performance evaluation samples (to those obtained by commercial laboratories from NELAP Proficiency Test Sample Providers) or on-site inspections.

8.4 **Sample Quality Assurance**.

8.4.1. Sample Handling Quality Assurance. The QA laboratory provides immediate feedback regarding problems with sample shipments. The QA laboratory is responsible for checking the sample shipment for temperature, proper preservatives, correct containers etc. The contract laboratory coordinator, project chemist, or other appropriate technical personnel for the project is then notified within 24 hours regarding the status of the sample shipment via facsimile, electronic mail, or telephone call. For most projects, this is beneficial because problems are detected and resolved while the sampling team is still in the field. This approach reduces re-mobilizations to the field. The ERDC ECB laboratory, contract QA laboratory, and the contract primary laboratory complete and report a “Cooler Receipt Form" for all shipments sent to their respective laboratory. An example cooler receipt form is found in EM 200-1-3. A chain-of-custody record is initiated at the sampling stage and maintained throughout the analysis and reporting stages of the process. Sample reports are easily traceable to chain-of-custody records. All documentation pertaining to sample receipt or analysis is included in the laboratory's data report.

8.4.2. QA Sample Collection and Analysis. QA sample collection and analysis is the main tool to determine that the data generated by primary laboratories is technically valid and of adequate quality for the intended data usage. Based on the needs of the project, a percentage of samples are homogenized (except samples for volatiles testing, which are co-located), split, given a unique sample identification, and sent to a primary contract laboratory and to a contract QA chemistry laboratory for analysis. QA sample collection does not have to be performed at the same frequency or rate for all test parameters, on all matrices, during all project phases, nor for any one type of project. General considerations include: 1) the data use and users as defined by the project-specific DQOs; 2) the total number of samples being generated (e.g., a larger number of total samples collected may lower the percentage of QA samples needed); and 3) the need for statistically significant information from QA sample data. Ideally, the USACE QA sample collection and analysis program is an interactive process whereby the chemistry laboratory in conjunction with the project chemist detects and solves problems as sampling and analysis occurs to ensure that the data generated for the project meets the project DQOs. The “value added” by this program can be divided into two areas, detecting analytical problems and salvaging data usability.

8.4.2.1. Detecting Analytical Problems. A primary function of the ERDC ECB or contract QA laboratory is to analyze samples as prescribed by the project and produce a data package that is reviewed real-time (at the bench during the time of analysis) for later

comparison to the primary laboratory's data. Analysis and comparison of the QA sample data to the primary sample data can reveal problems with primary laboratory data even when all other data quality measurements are in control. A common problem is over-dilution of semi-volatile organic analytes by the contract laboratories. Analysis by the QA laboratory can help in deciding whether this was due to actual matrix effect or due to inadequate sample cleanup by the contract lab.

8.4.2.2. Salvaging Data Usability. When the data comparison shows good correlation between the QA laboratory and primary lab data, this may bolster the credibility and usability of the data generated by the primary laboratory. This is especially true in cases where primary lab data comes under close scrutiny and fails some data quality criteria. Good correlation also reflects consistency in the sampling process, the lack of which is a major source of error or variation.

8.4.3. Data Review in the form of Chemical Quality Assurance Reports (CQARs). ERDC ECB, contract laboratory coordinator, assigned chemist, or other appropriate personnel prepare CQARs. The CQAR documents review of the QA laboratory data and the corresponding primary laboratory data. Data for project samples, QC samples and QA samples are compared, and the impact on the primary laboratory's data is documented.

8.4.4. Assessment of Data Usability in the form of Chemical Data Quality Assessment Reports (CDQARs). The project or assigned chemist prepares CDQARs. The CDQAR documents data usability, DQO attainment, and contract compliance.

8.4.5. Single or Double-Blind Performance Evaluation (PE) Sample Analysis. Another means of testing the analyst's proficiency in identifying and quantifying analytes of interest is the use of single or double-blind PE samples. Procedures for design, production, certification, and use of PE samples in the USACE Environmental Quality Assurance Program are detailed in EM 200-1-7. The originator, but not the analyst, knows the composition of PE samples. In a single-blind PE sample, both the originator and the analyst know that the sample is a PE sample. Double-blind PE samples are containerized, labeled, and submitted as project environmental samples. The analyst does not know that the sample is a PE sample; ideally, the PE sample is indistinguishable from the other project samples. The use of double-blind PE samples is considered a more effective way of detecting problems, since the laboratory would not be aware that it was being evaluated. However, it is sometimes difficult to disguise a standard reference sample as a project sample. Performance evaluation sample data are evaluated for compound identification, quantitation, and sample contamination. PE samples are recommended for sites that have the potential for a majority of non-detects, or for sites where the contaminants of concern have already been identified. Currently, the complete ranges of organic and inorganic PE samples are available for water only. Selected organic and inorganic PE samples are available for soil. In addition, it should be noted that Performance Testing (PT) materials from NELAP Accredited PT providers could meet the needs of single and double-blind analyses.

8.4.6. Review of Primary Laboratory Data. The prime contractor for contracted projects performs an independent data review of the entire primary data set. In addition, the project chemist, ERDC ECB chemist, or contract laboratory coordinator (usually a USACE chemist) also reviews a portion of the primary laboratory data. The percentage of primary laboratory data reviewed by the government depends upon the project-specific DQOs. The project chemist, ERDC ECB, or contract laboratory coordinator reviews all the primary laboratory data for in-house projects. Data review is conducted to ensure that: 1) QC data provided in the laboratory deliverables are scientifically sound, appropriate to the method, and completely documented; 2) QC samples are within established guidelines; 3) data were appropriately flagged by the laboratory; 4) documentation of all anomalies in sample preparation and analysis is complete and correct; 5) corrective action forms, if required, are complete; 6) holding times and preservation are documented; 7) data are ready for incorporation into the final report; and 8) data package is complete and ready for data archival.

8.4.7. Validation of Data. Data validation is the process of data assessment in accordance with EPA regional or national functional guidelines or project-specific guidelines. Data validation includes assessment of the whole raw data package from the laboratory.

8.5. **Audits**. Audits are preferably performed on an unannounced basis, and are coordinated with government geotechnical personnel, as appropriate. Audits are performed during any stage of the project.

8.5.1. Field Audit Procedures. The auditor is responsible for checking that samples are collected and handled in accordance with the approved project plans and for confirming that documentation of work is adequate and complete. Specifically, the auditor ensures that performance of field activities satisfies the project DQOs. Original records generated for all audits are retained within permanent project files. Records may include audit reports, written responses, record of the completed corrective actions, and documents associated with the conduct of audits that support audit findings and corrective actions. Details on contractor quality control of field activities are found in EM 200-1-3. For construction activities, the audit assesses the prime contractor's implementation of the three-phase chemical data control process. Additional information on the three-phase process is found in Corps of Engineers Guide Specifications (CEGS)-01440 and CEGS-01450 and additional information and requirements regarding performance of field audits (field oversight) may be found in Chapter 6 of EM 200-1-6 and Section 8.i. of ER 1110-1-8157.

8.5.2. Personnel. Trained and experienced personnel perform the field audits. These personnel are knowledgeable in the subjects necessary for assessing the quality of the work being observed, including thorough knowledge of the contractual requirements. Preferably, government personnel carry out field audits. The field audits are sometimes performed by contract personnel with some objective relationship to the work being conducted in the field (e.g., a prime contractor auditing its subcontractors). A number of training sessions are available (both internal and external to USACE) to provide the

needed understanding of the principles and proper execution of the USACE CDQM program. MSC and District staff members avail themselves of this training as appropriate.

8.5.3. Desk Audit of Field Activities. Another mechanism for auditing field activities as they occur is to include government technical review of Daily Quality Control Reports and field logs while the contractor is in the field. Desk audits of field activities require that these reports be supplied on a periodic basis (*e*.g., daily or weekly) to the USACE technical staff. The requirement for periodic reporting is included in the contract specifications or project delivery order, as well as in the project work plans.

8.5.4. Laboratory Audits. The primary and QA chemistry laboratories are responsible for maintaining detailed procedures to support the validity of all analytical work. Laboratory audits may consist of on-site inspections and/or analysis of PE samples. The audit verifies the laboratory's continuing ability to produce acceptable analytical data. These lab audits are designed to be project-specific, and may entail a thorough (real-time) review of project chemical data generated by the laboratory. If a performance problem is identified for sample analysis or data reporting, the HTRW-CX reserves the right to audit the laboratory anytime during its 18-month validation. Laboratory audits are carried out on either an announced or unannounced basis.

8.5.5. Tape Audits. The purpose of a raw data review (tape audit) is to assess the quality of the data and to evaluate the overall laboratory performance. This information is then used by the data user to evaluate data quality to make a determination on the acceptability and the usability of the data. The tape audit is designed to independently verify the data reduction practices of an individual laboratory. All of the raw data from a given batch is recalculated by the evaluator and is compared to the results reported by the laboratory. The data quality is measured by laboratory compliance with the required methods and acceptable laboratory practices for analysis and for data reduction. Tape audits can only be performed when a specific analytical instrumental raw data output has been stored electronically. To implement this type of audit the contract requires the laboratory to provide electronic data needed to perform the audit. In addition, a means to read the data and a chemist familiar with both the method and instrument used for data acquisition must be available.

8.5.6. Fraud Deterrence. Although not specifically designed to detect fraud, the USACE QA/QC program of laboratory validation and its maintenance activities (including standard operating procedures review, performance evaluation samples, and on-site inspection of the facility), laboratory data review, and QA sample collection and analysis (the primary laboratory is aware QA samples are being analyzed by a validated QA laboratory) has provided significant assurance and is a deterrent against fraud.

8.6. **Primary CDQM Activities**. While all twelve of the CDQM activities discussed in the previous sections may be used on a project, six of the twelve are used on most projects. The six primary CDQM activities for USACE HTRW projects are 1) validation of primary and QA laboratories, 2) technical document review, 3) sample handling quality assurance, 4) QA sample collection and analysis, 5) preparation of Chemical Quality

Assurance Reports (CQARs), and 6) preparation of Chemical Data Quality Assessment Reports (CDQARs). These compliance monitoring procedures elements are routinely considered as candidates for inclusion in each project's set of CDQM activities.

8.6.1. Documentation of Selected CDQM Activities. The CDQM activities selected for each project are documented in the project-specific DQOs. A recommended procedure for documentation of the CDQM process is presented in American National Standard, Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs (ANSI/ASQC E-4, 1994).

8.6.2. Waiver of CDQM Activities. USACE Environmental Restoration / HTRW policy allows for any aspect of the program to be waived except for the following three requirements: (1) use of the technical project planning process culminating in project-specific DQOs; (2) use of analytical service providers with verifiable quality systems compliant with the principles of International Organization for Standardization (ISO) 17025 ("General Requirements for the Competence of Calibration & Testing Laboratories"); and (3) program and project execution in accordance with the requirements of ANSI/ASQC E4 as specified in ER 1110-1-263 Section 8.b (ref. 1.1.3.r.). ER 1110-1-263 states that the District PM with concurrence from the technical project team may waive all other CDQM elements for a specific project as defined in EM 200-1-2 (ref. 1.1.3.d.). The intent of ER 1110-1-263 is to provide a flexible CDQM program that produces data of known quality to satisfy the project-specific DQOs.

If the project chemist in conjunction with the PM and technical project team decides not to use all of the six primary CDQM elements discussed above, a memorandum for record (MFR) is required. The District PM documents in the MFR what procedures will replace the waived compliance monitoring activity and demonstrate the concurrence of the technical project team including the project chemist. The project chemist will typically be tasked by the PM to prepare this documentation. The MFR includes the PM's signature and the project team's concurrence along with the following elements: 1) brief description of the project; 2) summary of the project objective; 3) description of the waived CDQM activities; and 4) description of alternate procedures to ensure data quality. Districts with insufficient staff chemist resources to provide technical team support rely upon the HTRW Design District, the ERDC ECB professional staff, or the HTRW-CX for chemistry support.

8.7. **Use of QA Samples by Project Phase**. The use of QA and QC samples is a particularly powerful tool for maintenance of data quality. With primary, QA and QC data for a single sampling point one may perform both inter-laboratory and intra-laboratory data comparisons. In addition, QA samples may provide unique indications about the quality of the primary laboratory's data. The following sections describe the use of QA samples in various project phases.

8.7.1. Investigative Phase. The use of QA samples during the investigative phase adds value by verifying the analytes of concern and quantifying the levels of contamination. In general, QA samples are targeted in locations of known or expected contamination. If the primary and QA laboratory data are comparable, then this provides

an additional level of confidence that the correct action was taken. If the primary laboratory data do not compare with the associated QA laboratory data, then this assures that the data from the site are completely evaluated prior to a decision. In addition, the QA laboratory data yields information regarding the spatial heterogeneity of the soil contamination.

8.7.2. Pre-Design Phase. The pre-design phase consists of bench and pilot scale studies. If data generated from these activities are used to size the system, accuracy of results is critical. Any false positive or false negative from the bench or pilot study could result in costly changes following construction of the completed system. QA sample collection provides a verification of the prime contractor's results for use in their design.

8.7.3. Remedial Action Phase. The remedial action phase consists of treatment system analytical support. Verification of results from the actual treatment operations is a critical check for long-term operation of the system. QA samples would be useful during the early stages of the project when the system is optimized or at stages of major equipment changes. Many treatment systems focus on discharge quality and verification of the results aids in the acceptability by the regulators.

8.7.4. Post-Remedial Action Monitoring. The post-remedial action phase typically includes post-excavation confirmation sampling and/or treatment system analytical support. QA sample checks on post-excavation samples can bolster regulator's confidence in the effectiveness of remediation. Analytical support during the operation and maintenance (O&M) phase can last up to 30 years in the case of long-term monitoring. In all likelihood, the primary laboratory would change several times during the course of a long-term monitoring project. Use of the same QA laboratory would be instrumental in providing continuity from one laboratory’s results to another and for resolving problems that inevitably arise when a large volume of data is collected over a long period of time.

8.7.5. Omission of QA Samples. For certain projects, QA samples may not be the best method of ensuring attainment of data quality objectives. The decision to omit QA samples for a given project is made by the project chemist in conjunction with the PM and technical project team. Omission of QA samples is based on meeting project objectives and goals, rather than simply to reduce cost. The project chemist balances the need to maintain quality with the need to perform work for a reasonable cost. The project categories that may not be good candidates for QA sample collection are described below.

8.7.5.1. Underground Storage Tank (UST) Removals. Samples collected to meet state or federal requirements pertaining to UST removals may omit QA samples if regulatory deadlines preclude the QA process.

8.7.5.2. Lead Paint Testing. Construction building material and debris sampling to test for leaded paint is not generally considered to be Environmental Restoration work. Samples of building materials or debris collected solely to test for the presence of leaded paint will not typically benefit from use of QA samples.

8.7.5.3. Asbestos Testing. Construction building material and debris sampling to test for asbestos is not generally considered to be Environmental Restoration work. Samples of building materials or debris collected solely to test for the presence of asbestos will not typically benefit from use of QA samples.

8.7.5.4. Process Monitoring. Samples collected to demonstrate the day-to-day efficacy of intermediate steps during a treatment process will not typically employ QA samples. However, collection of QA samples from the treatment system influent and discharge locations is recommended on an occasional basis.

8.7.5.5. Waste Characterization. Samples collected of drummed materials, tank contents, barrels, and similar materials for hazardous waste profiling do not usually employ QA samples.

8.7.5.6. Treatability Studies. Samples collected as part of a treatability study to demonstrate the efficacy of a remedial process do not usually employ QA samples. QA samples are recommended for optimization studies.

8.7.5.7. Air Samples. Samples collected as part of an ambient air monitoring program usually do not employ QA sample collection. Specifically, this would apply to co-located air samples for both gas phase and particulate related components since co-located samples are not homogeneous. Gas phase samples collected with a split-sampling device are likely to be homogeneous, and QA samples may provide added value.

8.7.5.8. Wipe Samples. Wipe samples (*i.e.* for PCB analysis, metals, etc.) will not usually benefit from QA sample collection since co-located wipe samples are not identical.

8.7.5.9. Non-routine Methods. Certain methods are experimental, or laboratory-specific, and it is not possible to replicate them in a QA laboratory. If duplication of the method is difficult, QA samples are not usually employed.

8.7.5.10. Screening Data. Samples collected as part of a screening program usually do not employ QA sample collection. This would include screening data generated from immunoassay test kits, x-ray fluorescence, colorimetric, or field gas chromatography analyses.

8.8. **Procedures for CDQM and Construction Quality Management by Project Phase**. The following paragraphs outline the procedures for chemical data quality and construction quality management for the investigative, pre-design and design, and remedial or removal action phases of the USACE Environmental Restoration program. The outlined activities demonstrate use of the six primary CDQM activities described earlier in Section 8.6. and in the technical document review process for Category A projects described in Section 8.2.

8.8.1. Investigative Phase. The investigative phase consists of site characterization, engineering analysis, risk assessment, potentially responsible party (PRP) data gathering, and regulatory analysis. The investigative phases from the CERCLA process are the Preliminary Assessment/Site Inspection (PA/SI) and the Remedial Investigation/Feasibility Study (RI/FS). The investigative phases from the RCRA process are the RCRA Facility Assessment (RFA), RCRA Facility Investigation (RFI) and the Corrective Measures Study (CMS). For non-time critical removal actions, a PA/SI is performed initially and is followed by an Engineering Evaluation/Cost Analysis (EE/CA). The EE/CA takes the place of the RI/FS. The HTRW Design District writes the scope of services. For Category B projects (see paragraph 8.2.1.), the HTRW Design District submits scope of services to HTRW-CX for review. The HTRW Design District solicits prime contractor services, negotiates, and awards the contract or delivery order. The prime contractor identifies primary laboratory to the District. The PM, project chemist, project engineer, or other appropriate technical personnel for the project requests validation of the primary laboratory by the HTRW-CX via electronic mail or facsimile.

8.8.1.1. The HTRW-CX follows the process described in EM 200-1-1 (ref. 1.1.3.c.) to validate the laboratory. If the laboratory has not previously been validated by the HTRW-CX, the project chemist screens the laboratory to determine if its technical capabilities merit validation. Depending on the laboratory's validation status, some or all of the following procedures may be omitted. If requested by the HTRW-CX, the primary laboratory submits its Laboratory Quality Management Manual (LQMM) or Quality Assurance Plan (QAP), a representative standard operating procedure (SOP); to demonstrate the laboratory has the capability to run the required methods, and petroleum hydrocarbon SOPs (if necessary) to the HTRW-CX. Based on satisfactory review of the QAP and SOPs, performance evaluation samples are sent if available. The laboratory is then inspected by HTRW-CX. Personnel from the HTRW Design District and ERDC ECB may assist with this process. If the laboratory fails to become validated, another laboratory is selected.

The prime contractor submits the Quality Assurance Project Plan (QAPP) for HTRW Design District review and approval. Other environmental regulatory programs may require different documentation than a QAPP. For Category B projects (see paragraph 8.2.2), the HTRW Design District sends the QAPP to the HTRW-CX for review, the HTRW-CX provides recommendations for improvement back to HTRW Design District.

From the QAPP, the HTRW Design District or the ERDC ECB makes an estimate of the cost of QA sample analysis. The budgeted amount is funded by the HTRW Design District to the ERDC ECB, contract laboratory coordinator, or contract QA laboratory prior to sending samples for QA analysis. The HTRW Design Districts provide the ERDC ECB, contract laboratory coordinators, and/or contract laboratories with the following information: 1) project name; 2) approximate sampling dates; 3) number of samples; 4) matrix (matrices); 5) analyses; 6) DQOs; and 7) turnaround time.

8.8.1.2. Fieldwork begins after the HTRW Design District approves the QAPP and the technical team leader or project chemist coordinates with the prime contractor for (commencement of) field and laboratory activities. Samples are collected in the field

with project and QC samples shipped to the primary laboratory and QA samples shipped to a different laboratory. QA laboratory support is available to the Districts from the ERDC ECB laboratory located in Omaha, NE. As mentioned in Section 1.3.2., the ERDC ECB is aligned with the Environmental Laboratory at the Engineer Research and Development Center (ERDC) located in Vicksburg, MS. Technical project planning teams determine the best course of action to obtain QA laboratory functions using either the ERDC ECB or a contract laboratory. All laboratories selected for use have been currently validated by the HTRW-CX validation procedure and are subject to audit at any time as previously discussed.

The primary laboratory and the ERDC ECB laboratory (or contract laboratory coordinators) are notified upon final shipment of project samples. The prime contractor's analytical results are submitted to the HTRW Design District within the time frame identified in the contract. The analytical results that correlate with the QA samples are sent to the ERDC ECB (or contract laboratory coordinators) at the same time. A ERDC ECB chemist (a project chemist, or a contract laboratory coordinator) prepares the Chemical Quality Assurance Report (CQAR) and submits it to the HTRW Design District and the HTRW-CX. The HTRW Design District provides the CQAR to the prime contractor for inclusion in the project report.

The prime contractor prepares the draft project report and submits it to the HTRW Design District. The project report includes the CQAR, as well as the contractor's assessment of the primary laboratory data. The report is reviewed by the same office(s) that reviewed the QAPP. The project chemist writes the Chemical Data Quality Assessment Report (CDQAR) or an equivalent report addressing data usability and DQO attainment from information received from the prime contractor and the CQAR. CDQARs (or an equivalent report) are prepared for all in-house and contractor executed projects. CQARs and CDQARs are sent to the HTRW-CX for all projects.

8.8.2. Pre-Design and Design Phase. The pre-design and design phase of the Environmental Restoration program consists of remedial action selection and design. The CERCLA design phase is remedial design (RD). The corresponding RCRA phase is called the corrective measures design (CMD). The following outline applies when a contractor prepares the design. Modifications are required if the design is performed in-house.

8.8.2.1. Design District writes scope of services. For Category B projects (as discussed earlier in Section 8.2.), the HTRW Design District submits scope of services to HTRW-CX for review. The HTRW Design District solicits prime contractor services and also negotiates and awards prime contractor design contract or delivery order. If investigative activities are included in the design contract, steps discussed above in the investigative phase (Section 8.8.1.) are followed.

The prime contractors submit design analysis reports that contain a section that specifically addresses chemical quality management concerns. The prime contractor also submits plans and specifications, which include chemical quality management at the preliminary, intermediate, and final phases. For the Total Environmental Restoration Contract (TERC), the prime contractor submits a Work Plan for each delivery order. The prime contractor submits these documents to the HTRW Design District for approval.

The chemical section of the plans and specifications or work plan gives the construction contractor instructions for writing the QAPP in addition to including all necessary site-specific chemical detail. For Category B projects, the HTRW Design District submits these documents (to include the design analysis, plans and specifications, and the work plan) to the HTRW-CX for technical review, and comments are sent back to the HTRW Design District.

The HTRW Design District assures that appropriate comments are addressed and incorporated into the documents. Revised documents and annotated comments are sent to the offices generating comments at the next submittal stage. The HTRW Design District approves the final (100%) plans and specifications. From the contract specifications, a preliminary estimate is made of the funding required to support specified QA activities. The District advertises and awards the construction contract. For a Request for Proposal (RFP), the District solicits proposals from construction contractors. The District technical team evaluates the proposals and selects a contractor. Several other contracting mechanisms (*i.e.* Invitation for Bid (IFB), cost-plus, etc.) exist that could be used instead of the RFP.

8.8.3. Remedial or Removal Action Phase. Many construction offices do not have sufficient chemistry training to make the decisions necessary to support the HTRW program. These construction offices rely on basic chemistry support from resources at their HTRW Design District, ERDC ECB, or the HTRW-CX. Several guidance documents integrate chemical data quality assurance for remedial actions into existing QA procedures for construction, including: ER 415-1-10, Construction Contractor Submittal Procedures (30 May 1995); ER 415-1-302, Construction Inspection and Work Records (30 December 1993); ER 1180-1-6, Construction Quality Management (30 September 1995); EP 715-1-2, A Guide to Effective Contractor Quality Control (01 February 1990); CEGS 01440, Contractor Quality Control (October 1994); and CEGS 01450, Chemical Data Quality Control (November 1994).

The District representative requests validation of the primary laboratory by the HTRW-CX via electronic mail or facsimile that initiates the process and procedures for laboratory validation. The designated HTRW Design District, ERDC ECB laboratory, or HTRW-CX (depending upon which organization is providing the basic chemistry support for the project) assists the construction District in reviewing the QAPP and makes recommendations to the construction District. The construction District approves/disapproves the prime contractor's QAPP. Construction begins after QAPP and prime contractor's laboratory is approved. The laboratory is subject to audits as previously discussed.

8.8.3.1. The construction representative coordinates with the prime contractor for field and laboratory activities. QA samples are sent to the contract QA laboratory or ERDC ECB laboratory throughout the duration of the sampling effort or as defined by the contract specifications. The prime contractor notifies the primary laboratory and the ERDC ECB laboratory or contract QA laboratory when the final project samples have been sent. The prime contractor's analytical results are submitted to the construction office for transmittal to the ERDC ECB laboratory (or contract laboratory coordinator) or project chemist within the time frame identified in the contract. The ERDC ECB chemist,

contract laboratory chemist, or contract laboratory coordinator prepares the CQAR and submits it to the construction District and the HTRW-CX. The construction District provides the CQAR to the prime contractor for inclusion in the project report.

The prime contractor submits the project report to the construction District. The project report includes the CQAR, as well as the contractor's evaluation of the primary laboratory data. The construction representative reviews the report with assistance from the HTRW Design District, ERDC ECB, or HTRW-CX staff, as requested. The construction District writes the CDQAR addressing contract compliance, data usability and DQO attainment from information provided by the construction contractor and the CQAR. The Construction District sends CDQARs to the HTRW-CX for all projects.

8.9. **Data Management and Archival Process**. The prime contractor and laboratories are responsible for generating, controlling and archiving laboratory and field records for all projects. This information is maintained with a system that is effective for retrieval of any documentation that affects the reported results. Data generated and owned by USACE shall be documented according to the Federal Geographic Data Committee's *Content Standard for Digital Geospatial Metadata* (ref paragraph 8.k. of ER 1110-1-8157). Documentation and presentation of other data shall be as negotiated and agreed upon on a project specific basis. The PM or technical team leader determines whether supporting data is transferred from the prime contractor to the USACE upon contract completion or have the prime contractor responsible for archiving the data. This includes record generation and control, security, and maintenance of all project related documents. The duration of laboratory data and field record retention is specified as part of the project DQOs.

8.9.1. Laboratory. The laboratory prepares and retains full analytical and QC documentation that allows sample tracking from initiation to disposal. The following minimum records are stored for each project: 1) original work order, chain-of-custody, and other pertinent documents received with the samples, 2) communications between the laboratory, field, and the customer, 3) any associated corrective actions, 4) laboratory data packages, 5) finalized data report, 6) laboratory log books, and 7) electronic data. The laboratory also maintains its QAP and relevant SOPs for the methods performed.

8.9.2. Field. Project-specific records that relate to field work performed are also retained. These records may include correspondence, chain-of-custody records, field notes, and reports issued as a result of the work. In addition, records that document all field operations are retained. This may include equipment performance records, field log books, drilling logs, maintenance logs, personnel files, general field procedures, and corrective action reports. For field operations hard copy records are acceptable.

8.10. **Construction Management**. The Corps of Engineers' philosophy for quality management in construction is outlined in ER-1180-1-6, Construction Quality Management. Obtaining quality construction is a combined responsibility of the construction contractor and the government. Their mutual goal is a quality product conforming to the contract requirements. QA is required on all construction contracts. The contractor controls the quality of the work and the Government, in a separate but

coordinated effort, assures that the level of quality set by the statement of work or plans and specifications is achieved.

8.10.1. Contractor Quality Control (CQC). CQC is the system by which the contractor bears responsibility for all activities necessary to manage, control, and document work to comply with contract plans and specifications. The contractor's responsibility includes ensuring adequate quality control services are provided for work accomplished on-site and off-site by his/her organizations, suppliers, subcontractors, laboratories, and technical consultants. The work activities include safety, submittal management, and all other functions relating to the requirement for quality construction. Prior to the start of work, the contractor prepares a CQC plan indicating staff organization, control of materials, installation techniques, and conformance testing. The original submission of this plan applies to all contract work and is effective for the life of the project. Further information on the interrelationship between the CQC and quality management is contained in the EFARS.

On receipt of the CQC plan, the field engineer reviews the plan to verify conformance with the CQC contract provision. All increments of the CQC function must be addressed with the intention of presenting a complete plan, and the field engineer's review compares and evaluates each of its features against the specified requirements. The following are key points typically checked as part of this review:

+ The name, qualifications, and delegated authority of an officer of the corporation.
+ Procedures for managing material submittals, including those of subcontractors.
+ Control testing procedures for each specific test required in the contract, including laboratory facilities.
+ Reporting procedures centering on the three-phase inspection of construction, including proposed reporting formats.

The Contracting Officer's Representative (COR) provides a prompt written response to the contractor accepting the CQC plan as submitted or with specified changes subject to satisfactory performance. A contractor's concurrence with exceptions may be required before start of work. After acceptance of the CQC plan, the contractor notifies the COR in writing of any proposed change. Proposed changes are subject to acceptance by the COR.

8.10.2. Government Quality Assurance. The quality assurance process starts well before construction and may include a number of related activities. These activities include reviews of the plans and specifications for biddability, constructibility, operability, and environmental responsibility; plan-in-hand site reviews; coordination with using agencies or local interests; establishment of performance periods and quality control requirements; field office planning; preparation of QA plans; reviews of QC plans; participation in design review conferences; enforcement of contract clauses; maintenance of QA/QC inspection and work records; establishing CQC requirements; etc. performed prior to the start of construction. (Note. Many of these activities may not be applicable to cost-reimbursement work.)

ER 1180-1-6 ("Construction Quality Management") requires that the field engineer develop a written QA organization plan that addresses the overall QA operations of the field office. The plan states, in detail, how the CQC activities will be monitored, responsibilities and authority of QA personnel, types of inspections to be performed by QA personnel, methods to be used for inspections performed by the Government, and specific steps to assure compliance of the work with the plans and specifications. After initial development, the plan will be reviewed and updated as often as necessary, but not less than annually. Supplements incorporating project specific requirements should be developed for those contracts with unique requirements not covered in the basic plan.

The QA plan includes:

+ The field's QA organization.
+ Procedures for reviewing contractor submittals, quality control reports, and test results.
+ Procedures for surveillance of CQC activities.
+ Procedures for reviewing CQC reports.
+ Procedures for reporting construction deficiencies and following up to assure correction.
+ Procedures to assure that the contractor submits all items required by the contract, particularly repetitive items.
+ Procedures for sampling, testing, and QA inspection by Government personnel.

A suggested outline for the QA plan is found in ER 1180-1-6. In accordance with ER 1180-1-6, the field engineer conducts a CQC/QA coordination meeting for detailed planning of activities of Government and contractor quality construction elements. Minutes of this meeting are prepared. On small contracts this meeting may be a part of the preconstruction conference. QA efforts at the inception of each phase of work are particularly effective, since corrective actions are easier to implement at this stage.

The main duty of Quality Assurance Personnel, through monitoring of CQC operations, is to assure that the work is being performed in accordance with the plans and specifications and that the CQC system is functioning effectively. To accomplish this, QA personnel (a) study the plans and specifications in advance, (b) anticipate problems and requirements, (c) perform necessary investigations on a phase of work well in advance of work commencement, and (d) obtain the COR's approval of shop drawings before materials are brought on the job.

QA personnel should be informed that assistance and advice is provided to them, whenever it is needed. Immediately available to them is a copy of the plans and specifications, including all necessary reference material, amendments, revisions, and modification; approved shop drawings for material on the job; applicable volumes of the Construction Inspector's Guide; a copy of EM 385-1-1, Safety and Health Requirements Manual; a copy of the contractor's accident prevention plan; a copy of the CQC plans; site specific safety and health plan, including the enclosed Activity Hazard Analysis Program; daily log reports or books; and camera, rules, tapes, and other measuring devices of testing equipment as required to check the various items of work for which the QA personnel are responsible.

Many HTRW projects have unique features requiring special QA actions. For example, paragraphs 8.i.(3) and 8.i.(4) of "Geotechnical Data Quality Management for Hazardous Waste Remedial Activities" (ER 1110-1-8157) identifies unique geotechnical features which require Government acceptance testing. Also, EP 415-1-261 (Volume 5, "Quality Assurance Representative's Guide – Ground Water Extraction, Ground Water Treatment, landfills, Soils Vapor Extraction, Slurry Walls, and Solidification/Stabilization") identifies unique oversight requirements for remedial measures used on hazardous waste sites.

8.10.3. Three-phase control concept. The field engineer ensures that CQC inspections are performed at the outset of each new phase or segment of construction. Preparatory inspections prior to physical work placement ascertain that materials comply with specification and/or approved submittal documents. Initial inspections occurring at the outset of work placement establish and achieve workmanship standards at the beginning of each construction phase. Government participation in preparatory and initial inspections is highly desirable. Follow-up inspections on a daily or routine basis are more productive when preceded by joint contractor/USACE preparatory and initial inspections. Preparatory and initial inspections are performed with checklists to ensure thoroughness. All phases of inspections are documented. It should be kept in mind that the contractor is responsible for conducting these inspections, while the Government is responsible only for assuring they are conducted, are adequate for the purpose, and are properly documented.

8.10.4. Deficiencies in contract performance. The field engineer is on the alert for deficiencies and their prompt correction. Upon detection of a deficiency, the contractor is first informed verbally and, where necessary, the verbal notification is immediately confirmed in writing. Additionally, the USACE representative makes a descriptive entry on the daily QA report and the field engineer insists that a like entry be made by the contractor on the daily CQC report. The District is promptly informed of any refusals by the contractor to correct a deficiency. A complete record is kept of facts relating to the deficiencies in contract performance and efforts to correct them. A number of different remedies are available to the Government, depending on the type of deficiency and the type of contract.

9. Assessment and Response

9.1. **Project and Program Review Boards**. As mentioned earlier, the project delivery team periodically evaluates all projects against the baseline requirements (scope, schedule, quality, and cost) established in the project management plan. The PM has the responsibility to challenge work in progress, identify variances and evaluate alternatives. The project delivery team's focus for meeting project execution goals is to maintain the baseline quality requirements in the project management plan. Controls are in place to facilitate timely corrective actions to ensure that changes do not exceed performance thresholds or limitations established by laws, policy, or regulations. All changes within project resource requirements defined in the project management plan are approved by the PM. Project/Program Review Board (PRB) meetings are held at the MSC (quarterly) and District (monthly) levels to keep senior management informed of progress, resolve issues,

and assess performance. Members of the PRBs are the MSC and District Commanders and his or her designated senior staff members. Customers participate in PRB meetings as appropriate.

9.2. **Quality Management Reviews**. To assure that the quality requirements are met, HQUSACE, in coordination and cooperation with MSCs will conduct quality management reviews. These reviews are made to assess the effectiveness and implementation of individual USACE command's quality management plans. The reviews are accomplished in a stand-alone mode or in conjunction with other command inspections/reviews (i.e., command inspections, Engineer Inspector General inspections, etc.). Regardless of how conducted, higher authority review of quality management plans at all operating USACE commands is accomplished on a three-year frequency, as a minimum. The MSC Civil Works and Management Directorate will periodically review the MSC as well as their executing organizations' implementation of the USACE PMBP to evaluate the effectiveness of their quality assurance, efficiency, and execution. Executing organizations (i.e., Districts, FOAs, Laboratories, etc.) shall periodically assess their project and program management processes and practices to ensure effective implementation of the plan requirements.

9.3. **MSC and CX Audit Responsibilities**. The MSCs with requested support from the HTRW and/or OE-CXs, selectively audit or review the QC processes (within their respective jurisdiction). This includes meeting periodically (usually on at least an annual basis) with Districts to review their quality control processes through evaluation of selected products and services at various stages of development to assure compliance with the QMP and to assess their quality. These reviews also help to identify system problems, trends, and improvements (when needed) to the quality management and quality control process, and to assure compliance with current MSC and HQUSACE policy. The selection of products for detailed audits are based on a number of criteria, including the expressed needs and concerns of the District, new processes or techniques, or product types that have poor performance histories. Determination of the need for such audits are made at any time during product development.

9.3.1. Audit Process. The audit process may take many forms, including those discussed in section 8 of this QMP. Upon the determination that a formal audit is required of an entire functions quality management process, it shall consist of the following: (1) Letter notification to District Commander identifying need for QC audit, studies/projects to be audited, specific data required for audit (see general data requirements, below) and audit process and schedule specific to the identified studies/projects; (2) Review by QA team of project data provided by District; (3) Counterpart discussions (on an as needed basis); (4) Full audit of project documents (if determined necessary by QA team); and (5) Outbrief/report to the Chief of the functional element responsible for the technical product being audited and the District Commander on the Quality Management of the project.

9.3.2. General Data Requirements for Formal Audit. The data required for a specific study/project generally shall include the following: Brief description of the overall study/project and each activity related thereunto; QCP for study/project; Minutes of the

Technical Review Strategy Session; Comments made by the Independent Technical Review Team during both seamless and product specific reviews; Memoranda documenting resolution of ITRT comments; and list of products generated.

9.4. **Data Assessment**. Any time chemical data is generated, the quality is assessed prior to use. The type and degree of assessment required depends upon the project data quality objectives. Several different levels of data assessment exist, including data verification, data review, data evaluation, and data validation.

9.4.1. Data Verification. Data verification is the most basic assessment of data. Data verification is a process for evaluating the completeness, correctness, consistency, and compliance of a data package against a standard or contract. In this context, "completeness" means that all required hard copy and electronic deliverables are present. Data verification is performed by the ERDC ECB or contract laboratory coordinator for QA laboratory deliverables and by the laboratory contract holder for primary laboratory deliverables.

9.4.2. Data Review. Data review is the next step in the data assessment hierarchy. Data review is the process of data assessment performed to produce the chemical quality assurance report (CQAR). Data review includes an assessment of summary QC data provided by the laboratory. Data review may include examination of primary and QA laboratory data and the internal quality control and QA sample results to ascertain the effects on the primary laboratory's data.

9.4.3. Data Evaluation. Data evaluation is the process of data assessment done by project chemists to produce a chemical data quality assessment report (CDQAR). Data evaluation is performed to determine whether the data meet project-specific data quality objectives (DQOs) and contract requirements. To prepare a CDQAR, the project chemist relies upon the DQO summary from the Sampling and Analysis Plan, the CQAR, field oversight findings, laboratory audits, performance evaluation sample results, and any other data quality indicators available.

9.4.4. Data Validation. Data validation is required for certain projects. Validation is a process of data assessment in accordance with EPA regional or national functional guidelines, or project-specific guidelines. Data validation includes assessment of the whole raw data package from the laboratory.

9.4.5. Special Requirements. Often, the requirements for data assessment will depend upon the project phase. In particular, data for use in a risk assessment will have specific quality requirements. There are several excellent references on this topic, including Chapter 3 of EM 200-1-4, ["Risk Assessment Handbook: Volume I Human Health Evaluation", USACE 1995 and Volume II Environmental Evaluation, USACE 1996]; and "Guidance for Data Usability in Risk Assessments (Parts A and B) [Office of Emergency and Remedial Response, EPA Directive 9285.7-09A, 1992].

9.4.6. Required Level of Data Assessment. The degree of data assessment is different for screening level data than for definitive data. Screening level data are typically characterized by less stringent QA/QC procedures. Assessment of screening level data consists of checking whatever QA/QC indicators are available, and confirming the results with definitive analyses, usually at a 10% frequency.

9.4.7. Assessment of Definitive Data. Definitive data are characterized by rigorous QA/QC procedures. The following set of general procedures is applied to the extent possible for all definitive data sets.

9.4.7.1. Data Verification. Definitive data assessment begins at the primary and quality assurance (QA) laboratories. General processes for data quality management at the laboratory are described in EM 200-1-1 as well as EM 200-1-3. Once the data have met the laboratory's standards, data verification is performed to determine if the data package is correct and complete.

9.4.7.2. Data Review. Definitive data review is then performed. See ref. 1.1.3.f., for more details on the specifics of data review. Data review documents possible effects on the data that result from various QC failures. It does not determine data usability, nor does it include assignment of data qualifier flags.

The initial inspection of the data screens for errors and inconsistencies. The chemist checks the chain of custody forms, sample-handling procedures, analyses requested, sample description and identification, and cooler receipt forms. The chemist then verifies that the laboratory manager or quality assurance officer checked the data. Sample holding times and preservation are checked and noted.

The next phase of data quality review is an examination of the actual QC data. By examining data from laboratory matrix duplicates, blind duplicates, trip blanks, PE samples, equipment blanks, laboratory method blanks, laboratory control samples (LCSs), LCS duplicates (LCSDs), matrix spike (MS) samples, matrix spike duplicate (MSD) samples, surrogate recoveries, and field samples, the chemist can determine whether the data are of acceptable quality.

Both laboratory control samples and matrix duplicates are examined during data review. The precision of the data is quantified by the relative percent difference (RPD) between two results obtained for the same sample. The samples are either internal laboratory QC samples (*i.e.*, laboratory control samples) or field samples. A high RPD in an LCS/LCSD pair is an indication of overall method failure, and may result in the rejection of an entire data set. Laboratory matrix duplicates and matrix spike duplicates are also assessed by their RPD values. High RPD values for matrix duplicates indicate a lack of reproducibility, and such data are qualified or rejected. Any such results are noted in the assessment of data quality.

Data from blank samples are examined to determine if sample contamination occurred either during or after the sample collection. Equipment or rinsate blanks consist of reagent water passed through or over sampling equipment following sample collection and sample equipment decontamination. Contaminated equipment blanks indicate inadequate decontamination between samples, and the strong likelihood of cross-contamination between samples. Method blanks are blank samples prepared in the

laboratory and analyzed along with project samples. If analytes are detected in a method blank, it is a strong indication of laboratory contamination. This would raise the possibility that project sample aliquots were contaminated in the laboratory as well. Trip blanks are samples of reagent water that accompany the project samples from the field to the laboratory. Trip blanks accompany each shipment of water samples to be analyzed for volatile organic compounds. Analysis of the trip blanks indicates whether sample contamination occurred during shipment and/or storage.

Surrogate recoveries are scrutinized to ensure they fall within an acceptable range. Adequate surrogate recoveries in QC samples (blanks and LCSs) indicate that sample extraction procedures were effective, and that overall instrument procedures were acceptable. Surrogate recoveries in field samples are a measure of possible matrix effects and can indicate complete digestion or extraction of a sample. Surrogate recoveries outside control limits may result in qualified or rejected data.

A laboratory control sample (LCS) is an aliquot of a clean matrix (*i.e.*, clean water or sand) which contains a known quantity of an analyte. Good recoveries from an LCS indicate that the analytical method is in control and that the laboratory is capable of generating acceptable data. The evaluation of possible matrix effects and accuracy of the data are monitored by analysis of matrix spike and matrix spike duplicate samples. A matrix spike sample is prepared by adding a known quantity of an analyte to a field sample. The matrix spike duplicate is prepared in an identical manner. Matrix spike and matrix spike duplicates are analyzed at least once per every twenty samples, or once per batch, whichever is greater. Recovery of the matrix spike indicates the absence of a matrix effect and is another measure of data accuracy. Comparison of the matrix spike and matrix spike duplicate results provides an indication of data precision. All matrix spike and matrix spike duplicate data are examined. Low or high spike recoveries are evidence of matrix effects and poor accuracy; a high RPD for duplicates is evidence of low precision; all such results are reported in the data review.

A blind duplicate quality control (QC) sample is submitted to the primary laboratory, which analyzes the majority of the samples. Analysis of the QC duplicate sample provides a measure of sample homogeneity and intra-laboratory variations. An additional replicate sample is provided to an independent quality assurance (QA) laboratory, to provide a further test of sample homogeneity and a test of inter-laboratory accuracy. QA and QC samples effectively provide triplicate analysis of a subset of the total project samples. The three results for each set are carefully compared and tabulated. (Data comparison criteria for evaluation of data comparability are described in ref. 1.1.3.e.). If two of three data sets agree, each laboratory's internal QA/QC data are reassessed to determine which set of data is the most accurate. Data from related analyses are inspected to determine which set of data is more accurate.

9.4.7.3. Data Evaluation. Data evaluation follows data review. During data evaluation, the project chemist uses the results of the data review as summarized in the CQAR to determine the usability of the data. The CQAR documents the potential effects of QA/QC failures on the data, and the project chemist assesses their impact on attainment of DQOs and contract compliance.

9.4.7.4. Data Qualifiers. Data assessment results in documentation of the quality and usability of the data. Data qualifiers, called flags, are applied as appropriate to alert the data user of deficiencies in the data. The project chemist, taking into account the project-specific data quality objectives, applies data qualifiers. The qualifiers are different depending on the type of data evaluation performed and are defined appropriately within the documentation. Data validation by EPA functional guideline procedures may employ different flags than project-specific validation data qualifiers. Despite the data assessment flags used, the qualifiers serve the same purpose. The flags are used to delimit the usability of the data, generally because of quality control failures.

10. Quality Improvement

As mentioned earlier in Section 1, an aspect of TAQ, as a management approach, focuses on continuous process improvement. This approach is utilized with several systems within USACE to promote feedback and to assure continuous improvements in quality.

10.1. **Lessons Learned**. This system provides a means to identify real or potential problem areas in the HTRW program, collect ideas on solutions to these problems, and to make the information available to all USACE Commands engaged in this work. Evaluating project performance via the use of MSC process and product audits, independent technical reviews, and HTRW-CX reviews produces opportunities to further improve Corps business processes, in terms of execution, productivity, cost effectiveness, streamlined processes, timeliness, quality standards, and customer service. Project experiences, including success stories, are documented by the PM and the project delivery team to share lessons learned throughout the Corps. The HTRW-CX maintains an environmental lessons learned database available to all Districts and MSCs via the Internet. MSCs and Districts also utilize other methods to share lessons learned such as e-mail distribution lists, seminars, and post project meetings.

Utilization of the USACE HTRW Lessons Learned System provides USACE personnel involved in the HTRW program with a means of documenting valuable experience gained during execution of Environmental Restoration related activities. Sharing such experience with other Environmental Restoration personnel promotes more efficient execution of the overall USACE HTRW mission. The PRBs also provide a mechanism for sharing lessons learned.

10.2. **Chemical Data Quality Management Program**. The Chemical Data Quality Management Program is an important technical capability of the MSC's quality related activities. This program ensures that the type, quantity, and quality of analytical data collected meet all data quality objectives (DQOs) for the project. The DQO approach is used to organize key planning issues in a thoughtful sequence to ensure that the work effort will produce the type and amount of data required to determine the next course of action.

10.3. **Laboratory Validation**. Prior to performing project specific analysis, all primary and QA laboratories are required to demonstrate analytical competency through a detailed evaluation of the laboratories technical capabilities also referred to as the lab validation process (discussed in section 8).

10.4. **Customer Surveys**. The Corps of Engineers regularly solicits input from customers regarding performance and satisfaction. Surveys are also conducted on Corps support entities such as the HTRW-CX. These evaluations provide valuable lessons learned and ways to improve business processes.

10.5. **Employee Training**. As discussed in Section 3, it is the objective of the USACE to promote retention/development of technical expertise of MSC and District staffs by encouraging developmental assignments, quality training, professional registration, and participation in technical societies. Attendance at environmental training workshops and seminars also provide opportunities for employee development and thus quality improvement in USACE products and services.

10.6. **Partnering**. Another method USACE uses to continually seek better ways to make decisions that enable us to accomplish our environmental mission and to also generate broad support from other agencies and interests is through partnering. Partnering involves a commitment by the participants to foster quick project implementation, improve cost-effectiveness, and avoid conflicts and litigation disputes. It is a process by which two or more organizations with shared interests act as a team to remove all organizational impediments that prevent open communication within the team, to provide open access to information, and to empower working-level staff to resolve as many issues as possible. The Corps is committed to the concept of partnering and enthusiastically encourages participants in environmental restoration projects to work as a team. A partnering relationship enables the development of a clear sense of mission among all involved stakeholders and promotes appropriate empowerment, delegation, and assumption of responsibility.

10.7. **Innovative Technology**. To meet needs for technologies that will reduce costs and improve cleanup performance, the Corps has established an Innovative Technology Advocate (ITA) program. ITAs are located at HQUSACE, HTRW-CX and some of the MSCs and HTRW Design Districts, including Sacramento and Tulsa Districts. To promote the use of innovative technology throughout the Corps, a comprehensive Innovative Technology Program Plan has been developed and implemented. The ITAs face the challenge of overcoming barriers to the use of innovative technologies by bringing their knowledge of research, development, and technology transfer to the HTRW process. ITAs monitor emerging technologies from federal laboratories and industry to identify technologies that have the potential to reduce costs and improve environmental investigation and remediation. ITAs are active participants of the Interstate Technology and Regulatory Cooperation (ITRC) Work Group and are involved with their efforts to develop and facilitate the use of standardized processes for the performance (quality) verification of these new technologies. The ITAs also support the Federal Remediation Technologies Roundtable, serving on subcommittees to seek out the most effective ways

to disseminate information on innovative technologies and to enhance consideration of innovative technologies within the Corps. An Innovative Technology home page was created to disseminate information electronically. Further information can be found at www.environmental.usace.army.mil/info/technical/it/it.html.

ATTACHMENT A

ACRONYMS and ABBREVIATIONS

ACASS	Architect-Engineer Contract Administration Support System
ACO	Administrative Contracting Officer
A-E	Architect-Engineer
AFARS	Army Federal Acquisition Regulation Supplement
AFCESA	Air Force Civil Engineering Support Agency
AIS	Automation Information System
ANSI	American National Standards Institute
ARIMS	Army Records Information Management System
ARMS	Automated Review Management System
ASQ	American Society for Quality
A2LA	American Association for Laboratory Accreditation
BCOE	Biddability, Constructibility, Operability, and Environmental
BD/DR	Building Demolition/Debris Removal
CCAS	Construction Contract Appraisal Support System
CDQAR	Chemical Data Quality Assessment Report
CDQM	Chemical Data Quality Management
CEFMS	Corps of Engineers Financial Management System
CEGS	Corps of Engineers Guide Specification
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CMD	Corrective Measures Design
COEMIS	Corps of Engineers Management Information System
COR	Contracting Officer's Representative
COTS	Commercial Off-The-Shelf
CQAR	Chemical Quality Assurance Report
CQC	Contractor Quality Control
CX	Center of Expertise
DERP	Defense Environmental Restoration Program
DFARS	Defense Federal Acquisition Regulation Supplement

DOD	Department of Defense
DPM	Deputy for Programs and Project Management
EC	Engineering Circular
ECB	Environmental Chemistry Branch
EE/CA	Engineering Evaluation/Cost Analysis
EFARS	Engineering Federal Acquisition Regulation Supplement
EM	Engineering Manual
EOPs	USACE Environmental Operating Principles
EP	Engineering Pamphlet
EPA	(US) Environmental Protection Agency
ER	Engineering Regulation
ERDC	Engineer Research and Development Center
FAR	Federal Acquisition Regulation
FDM	Feature Design Memorandum
FOA	Field Operating Activity
FSP	Field Sampling Plan
FUDS	Formerly Used Defense Sites
GDQM	Geotechnical Data Quality Management
HQUSACE	Headquarters, US Army Corps of Engineers
HTRW	Hazardous, Toxic, and Radioactive Waste
ID/IQ	Indefinite Delivery/Indefinite Quantity
IFB	Invitation For Bid
IRC	Issue Resolution Conference
IRM	Information Resources Management
IRMSC	IRM Steering Committee
ISMP	Information Systems Modernization Program
ITA	Innovative Technology Advocate
ITRC	Interstate Technology and Regulatory Cooperation
ITRT	Independent Technical Review Team
LAN	Local Area Network
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicates
LQMM	Laboratory Quality Management Manual

MARC	Multiple Award Remedial Action Contract
MARKS	Modern Army Recordkeeping System
MFR	Memorandum for Record
MILCON	Military Construction
MOA	Memorandum of Agreement
MSC	Major Subordinate Command
MVD	Mississippi Valley Division, Corps of Engineers
NARA	National Archives and Records Administration
NAVFAC	Naval Facilities Engineering Command
NELAP	National Environmental Laboratory Accreditation Program
NEPA	National Environmental Policy Act
NWD	Northwestern Division, Corps of Engineers
NPL	National Priorities List
OE	Ordnance and Explosive
OPA	Oil Pollution Act
P2	Project Management System
PA/SI	Preliminary Assessment/Site Inspection
PDT	Project Delivery Team
PE	Performance Evaluation
P.E.	Professional Engineer
PM	Project Manager
PMBP	Program and Project Management Business Process
PMP	Project Management Plan
POC	Point of Contact
P-RAC	Pre-placed Remedial Action Contract
PRB	Project/Program Review Board
PROMIS	Project Management Information System
PRP	Potentially Responsible Party
PT	Performance Testing
QA	Quality Assurance
QAC	Quality Assurance Coordinator
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan

QC	Quality Control
QCP	Quality Control Plan
QMP	Quality Management Plan
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	RCRA Facility Assessment
RFP	Request for Proposal
RI/FS	Remedial Investigation/Feasibility Study
RMS	Resident Management System
RPD	Relative Percent Difference
QAPP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SF	Standard Form
SFO	Support for Others
SI	Site Inspection
SmART	Small Action Remedial Tool Contract
SOP	Standard Operating Procedures
SPD	South Pacific Division, Corps of Engineers
SSHP	Site Safety and Health Plan
SWD	Southwestern Division, Corps of Engineers
TAQ	Total Army Quality
TERC	Total Environmental Restoration Contract
TQM	Total Quality Management
UFC	Unified Facilities Criteria
UFGS	Unified Facilities Guide Specifications
USACE	US Army Corps of Engineers

ATTACHMENT B

DEFINITIONS:

Activity. An all-inclusive term describing a specific set of operations or related tasks to be performed, either serially or in parallel (e.g., research and development, field sampling, analytical operations, equipment fabrication, etc.), that in total result in a product or service.
Assessment. The evaluation process used to measure the performance or effectiveness of a system and its elements.
Audit. An independent, systematic examination to determine whether activities comply with planned arrangements, whether the arrangements are implemented effectively, and whether the results are suitable to achieve desired objectives.
Contractor. Any organization or individual that contracts to furnish services or items or perform work.
Customer. The owner, client, user, project manager (PM), or beneficiary of a service or product.
Data Quality Assessment (DQA). A statistical and scientific evaluation of the data set to determine the validity and performance of the data collection design and statistical test, and the adequacy of the data set for its intended use.
Data Quality Objectives (DQOs). Qualitative and quantitative statements that clarify technical and quality objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that are used as the basis for establishing the quality and quantity of data needed for support decisions.
Data Quality Objective Process. A Total Quality Management (TQM) tool, based on the Scientific Method and developed by the US Environmental Protection Agency to facilitate the planning of environmental data collection activities. The DQO process enables planners to focus their planning efforts by specifying the use of the data (the decision), the decision criteria (action level), and the decision-maker's acceptable decision error rates. The products of the DQO process are the DQOs (See also Graded Approach).
Data Usability. The process of ensuring or determining whether the quality of the data produced meets the intended use of the data.
Design. The process of (1) developing the analyses that define the required technical systems (e.g., environmental, geotechnical, hydraulic, architectural, structural, electrical, mechanical, fire protection, etc.) which will be utilized, (2) producing the technical portions of the construction contract documents (i.e., the drawings and specifications), and (3) preparing the construction or related cost estimate.
Document. Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results.
Engineering. For the purpose this document, the efforts of technical disciplines involved in producing a technical service or product (e.g., a design, engineering feasibility study, geotechnical report, environmental report, design analysis, facility master plan, hydraulics/hydrology analysis, construction cost estimate, etc.).

Field Operating Activities. Five entities within the USACE that assist in policy development and implementation and provide support services to the USACE. They include the Center for Public Works, Finance Center, Humphreys Engineer Center Support Activity, Marine Design Center, and Water Resources Support Center.
Functional Elements. Refers to the essential units (and staff) of the organization (i.e., MSC, District, FOA, etc.) responsible for carrying out its mission functions. Mission essential functions are defined and assigned to MSCs and Districts by HQUSACE.
Geographic District. Areas of work assigned to Districts based upon the physical location within the District boundaries and mission.
Graded Approach. The process of basing the level of application of managerial controls applied to an item or work according to the intended use of results and the degree of confidence needed in the quality of the results.
HTRW activities. Activities undertaken for the US EPA's Superfund Program, the Defense Environmental Restoration Program (DERP), including Formerly Used Defense Sites (FUDS) and Installation Restoration Program (IRP) sites at active DOD facilities, Environmental Restoration/HTRW actions associated with Civil Works projects, Oil Pollution Act (OPA) Program, and any other mission or non-mission work performed for others at Environmental Restoration/HTRW sites. Such activities include, but are not limited to, Preliminary Assessments/Site Inspections (PA/SI), Remedial Investigations (RI), Feasibility Studies (FS), Engineering Evaluation/Cost Analyses (EE/CA), RCRA Facility Investigations/ Corrective Measures Studies/ Corrective Measures Implementation/ Closure Plans/ Part B Permits, or any other investigations, design activities, or remedial construction at known, suspected, or potential Environmental Restoration/HTRW sites. Environmental Restoration/HTRW activities also include those conducted at petroleum tank sites and construction sites containing Hazardous, Toxic, and Radioactive Waste.
Independent Assessment. An assessment performed by a qualified individual, group, or organization that is not a part of the organization directly performing and accountable for the work being assessed.
Partnering. Partnering may be defined as "the development and sustainment of a relationship that promotes achievement of mutually beneficial goals". Expected benefits include improved efficiency and cost effectiveness, increased opportunity for innovation, and the continuous improvement of delivered products and services. Partnering is a voluntary relationship that builds upon the good relationship that exists among the professional participants involved in any engineering or design activity. Partnering is further described in ER 1110-1-12 (ref. 1.1.3.p.).
Program - is a group of projects, services or other activities that may be categorized by funding source, customer requirements or other common criteria for which resources are allocated and collectively managed.
Project. An organized set of activities within a program (products, services, etc.) intended to produce a specific expected outcome or solution to a customer problem or need. Customer, in this sense, is used in a broad manner and refers to discrete (even localized) entities, organizations internal or external to the Corps and, in some cases, the Nation as a whole.

Project Management Plan (PMP). The detailed, specific plan, used to manage and control the delivery of a project from its inception to completion.
Project Manager (PM). The leader of the project delivery team, responsible for managing the project parameters (budget, cost, safety, schedule, scope, and quality), as well as interfacing with those involved in the project process (customers, functional elements, government, and non-government entities).
Quality. The totality of features and characteristics of a product or service that bear on its ability to meet the properly developed stated or implied requirements of the user.
Quality Assurance (QA). An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement that measures the degree of excellence of and insures that the system is functioning to provide the desired specified product or service.
Quality Assurance Coordinator (QAC). The MSC point of contact regarding quality assurance of environmental products and services with responsibility to oversee District products and services and to provide environmental technical assistance to Corps personnel.
Quality Control (QC). The overall system of technical activities that monitors the degree of excellence provided for the performance of a task that meets the agreed-upon requirements or standards of the customer.
Quality Control Plan (QCP). A written technical management plan for a specific technical product or service (i.e., a contract requirement or an in-house effort). The QCP becomes part of the Project Management Plan (PMP).
Total Army Quality (TAQ). A leadership philosophy and management approach which empowers all individuals to build on the aggregate capabilities of our quality Army and focuses on continuous process improvement to meet or exceed the expectations of internal and external customers.